ELECTRICAL TIMES

THURSDAY
8 NOV.
1951
NINEPENCE

Mazda LAMPS

stay brighter longer

THE LAMPS WITH B T-H BEHIND THEM

THE BRITISH THOMSON-HOUSTON CO. LTD. (*Member of the A.E.I. Group of Companies*) 4371

Design on trial . . .

At the Crompton Parkinson Short-Circuit Testing Station a continuous programme of tests ensures that C.P. switchgear will do its job without fail. Crompton Parkinson Ltd. are members of the Association of Short-Circuit Testing Authorities.

PRODUCTS INCLUDE : ELECTRIC MOTORS OF ALL KINDS * ALTERNATORS & GENERATORS * SWITCHGEAR * B.E.T. TRANSFORMERS * TRACTION EQUIPMENT * CABLES * LAMPS & LIGHTING EQUIPMENT * YOUNG BATTERIES * CEILING FANS * INSTRUMENTS * HOUSE SERVICE METERS NELSON STUD WELDING SERVICE

ELECTRICAL EQUIPMENT

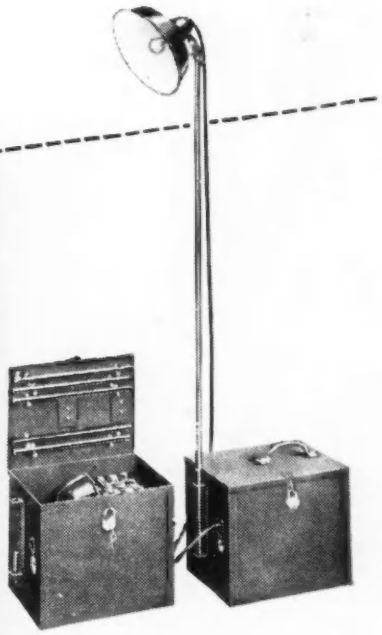
Crompton Parkinson LIMITED

CROMPTON HOUSE, ALDWYCH, LONDON, W.C.2

Tel : Chancery 3333 Grams : Crompark, Estrand, London

In an emergency, turn to NIFE

INSPECTION SET P.6



PORTABLE FLOODLIGHT SET
(TYPE F3M/HR)

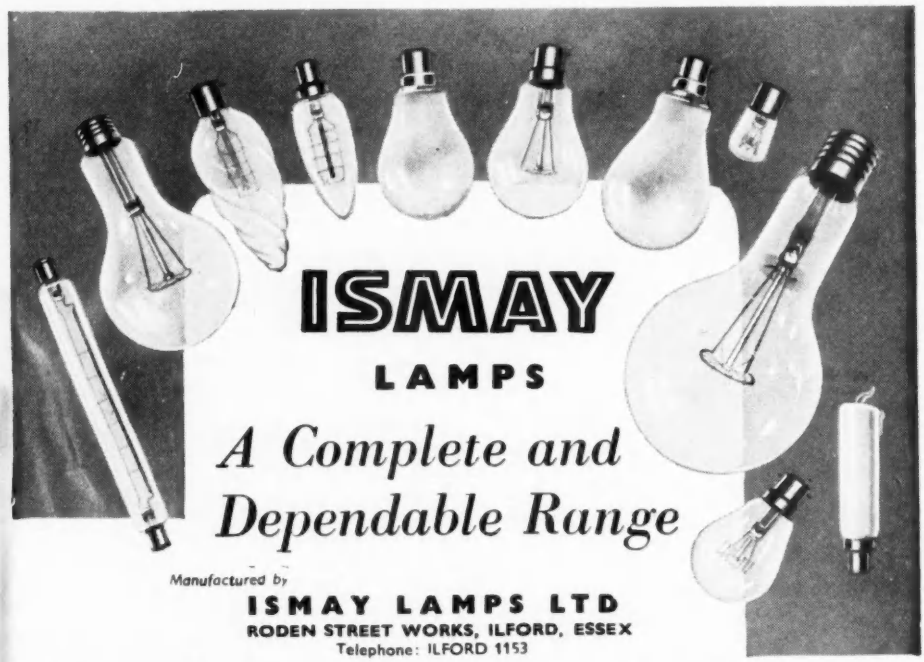
Emergencies and breakdowns will crop up from time to time. And when they do, it's good to know you have reliable aids, such as these two Nife lighting sets, always ready to be on the job at a moment's notice. The P.6 INSPECTION SET is a self-contained unit carried on the operator's body. A leather bag is provided for the projector, so that the operator has both hands free when the unit is not actually in use. The P.6 has been found particularly useful for inspecting overhead transmission lines. The F3M HR PORTABLE FLOODLIGHT SET gives brilliant, even illumination over a wide area. It is easily dismantled and fitted into the robust steel carrying box when not in service. Both sets are supplied with a NIFE Nickel Cadmium Alkaline Battery.

REMEMBER GENEROUSLY
SAT · NOV 10

For further details, please send for lists 1050 *and* 3750.

NIFE BATTERIES · REDDITCH · WORCESTERSHIRE N43

A



Manufactured by
ISMAY LAMPS LTD
RODEN STREET WORKS, ILFORD, ESSEX
Telephone: ILFORD 1153

ODDIE FASTENERS

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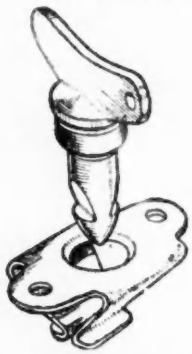
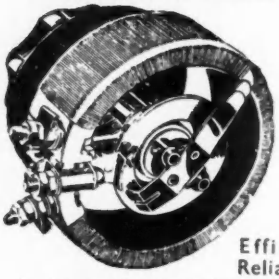


The **FASTENER** with **ENDLESS APPLICATIONS**
SIMPLE — POSITIVE — SELF LOCKING
Made in a variety of types and sizes
SPECIAL FASTENERS TO SUIT CUSTOMERS' REQUIREMENTS
Widely used in the Electrical Industry

ODDIE, BRADBURY & CULL LTD., Southampton
Tel.: 55883 Cables: Fasteners, Southampton

TOROIDAL WOUND POTENTIOMETERS



Efficient and Reliable, these instruments are second to none. Our Technical service will be happy to advise you in any difficulty, so do not hesitate to get in touch with us soon.

CRESSALL

registered Trade Name of
THE CRESSALL MANUFACTURING CO., LTD.
Tower Street, Birmingham 19
Telephone: ASTon Cross 2666 (3 lines) *Telegrams:* "OHMIC" Birmingham

Distinguished Lighting Fittings in Aluminium Alloy

LIST No. SW10 1G 100 WATT

MANUFACTURED BY

J. & G. COUGHTRIE LTD.

HILLINGTON, GLASGOW, S.W.2

CATALOGUE NO. 511 AVAILABLE ON REQUEST

TWICE the SELLING power with..

EKCO

DOUBLE-LIFE

FLUORESCENT LAMPS

THERE'S TWICE THE VALUE in Ekco double-life Fluorescent Lamps —that's why they sell twice as fast! Feature Ekco double-life Fluorescent Lamps and capture the new and replacement business in your area! Quicker turn-over and more customers mean bigger profits and bigger business in other lines, too. *Stock up now* with Ekco double-life Fluorescent Lamps.

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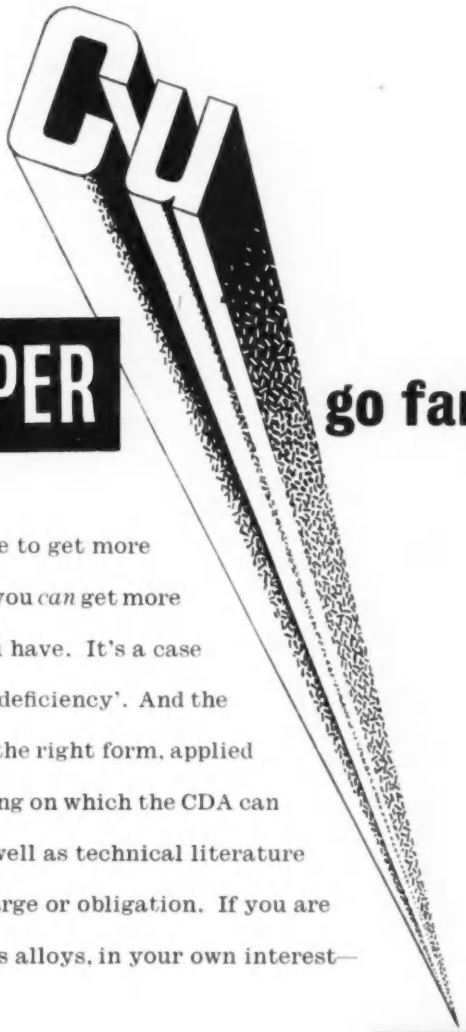
EKCO-ENSIGN ELECTRIC LTD.



Make COPPER go farther

You may not be able to get more copper at the moment, but you *can* get more from the copper you have. It's a case of 'more efficiency, less deficiency'. And the right material, in the right form, applied in the right way is something on which the CDA can give expert advice—as well as technical literature—free of charge or obligation. If you are concerned with copper or its alloys, in your own interest—

Consult the CDA

COPPER DEVELOPMENT ASSOCIATION KENDALS HALL · RADLETT · HERTS

B

ELECTRICITY

A Power Crisis threatens this Winter

The reason—demand has grown faster than the capacity to supply

In the year ending March 31st, 1951, British Industry used 23 thousand million units of electricity, one fifth more than in the previous year and twice as much as before the war.

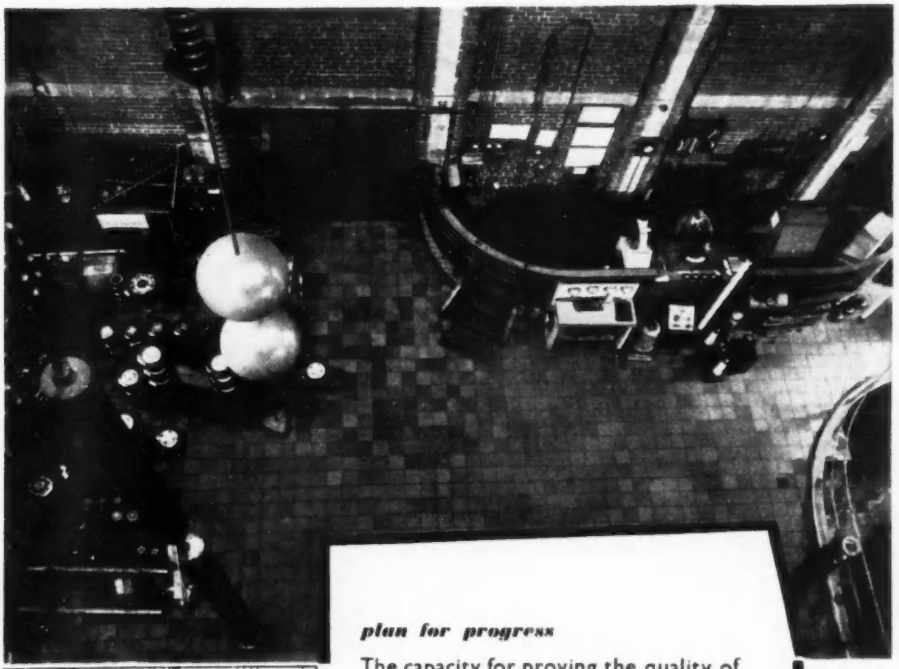
Still more power is needed for rearmament and for home and export production. It can be supplied, despite the plant shortage, by existing power stations — *if* . . . The " if " is that too many users do not switch on at the same time. When they do and " Peak " demands become too great, power cuts are necessary.

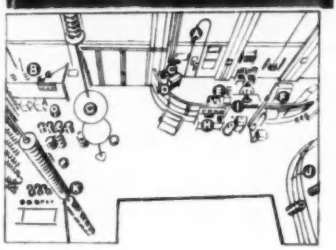
To help to stop power cuts, domestic users, shops, hotels and offices are urged to keep their electric fires switched off, and to cut down their demand in every possible way during Peak Hours. That will mean some sacrifice in order to keep the factories going.

Industries, in addition to their load-spreading arrangements, must use electricity with the utmost efficiency and economy. Above all there must be

NO WASTE

BRITISH ELECTRICITY





A. Apparatus for measuring resistivity of artificial rain.
B. A 50,000 volt transformer used for testing insulators under actual service conditions.
C. Meters for measuring leakage currents of polluted insulators.
D. Cathode ray oscillograph.
E. High speed cathode ray oscillograph.
F. Measuring dial of mechanical testing machine.
G. 1m. diameter aluminium spheres for the measurement of high voltages.
H. Apparatus for applying high hydraulic pressures.
I. Control desk.
J. Part of pit for the high voltage transformer of a cascade connected pair giving 500,000 volts. 50c. Sec.
K. Loading capacitor and potential divider of the 1·2 million volt surge generator.

plan for progress

The capacity for proving the quality of T.T Insulators, for testing design at every stage of advancement, and so maintaining the extremely high standards self-imposed by the T.T. organisation is graphically illustrated in this striking photograph of the high-voltage Test Laboratory at Hanley.

It is this thoroughness and attention to detail that has earned for Taylor Tunnicliff a world-wide reputation as Masters of Porcelain Insulation.

TT

Taylor Tunnicliff & Co Ltd.

Head Office : EASTWOOD · HANLEY · STAFFS
Telephone : Stoke-on-Trent 5272-4
London Office 125 HIGH HOLBORN W.C.1 *Telephone* : HOLborn 1951

TRADE MARK

HIGGS MOTORS LTD

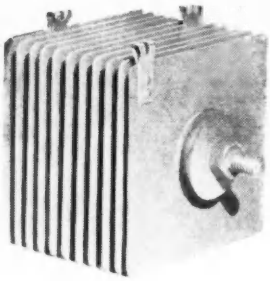
CHAIRMAN WALTER E. HIGGS M.I.E.E.

BIRMINGHAM 6 ENGLAND

Our fractional HP motors combine the essential features of compactness and high efficiency with outstanding reliability: fully reviewed in Specifications 100 & 102 and

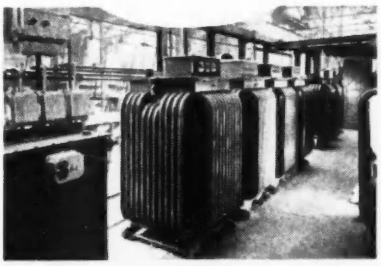
GUARANTEED FOR EVER

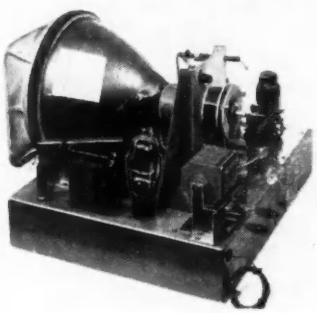
Belfast, Birmingham, Bristol, Dundee, Glasgow, London, Manchester, Newcastle, Peterborough, Sheffield, Wolverhampton



OUTSTANDING

for their efficiency and reliability





Westinghouse "Westalite" rectifiers now serving industry all over the world in so many varied applications have undoubtedly proved themselves to be without equal for efficiency and reliability, and their range of outputs is considerable.

At low voltages, such as required for all electro-deposition processes, cleaning, stripping, etching, etc., there is no limit to the output, and equipments of 16,000 amperes (oil immersed) are in service. At medium d.c. voltages, equipments of tens of kilowatts for power supply to machine tools, lifting magnets, magnetic separators, etc., can be supplied. There are also high voltage low current rectifiers (oil immersed) for electro-static precipitation, and miniature high voltage rectifiers for E.H.T. supplies for cathode ray tubes, etc., and H.T. rectifiers for radio and television. New "streamlined" battery chargers, single-phase and three-phase sets for cinema arcs all form part of the range of these dependable

WESTINGHOUSE

WESTALITE

METAL RECTIFIERS

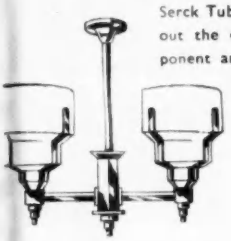
Write for a copy of D.S.I. which is an index of publications and applications to

DEPT. E.T.20

WESTINGHOUSE BRAKE & SIGNAL CO., LTD.

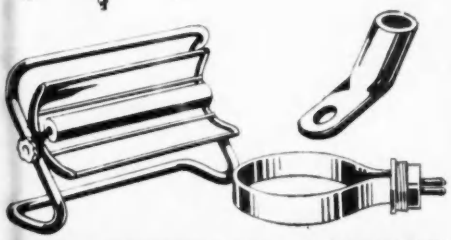
82, York Way, King[illegible], London, N.1, England.

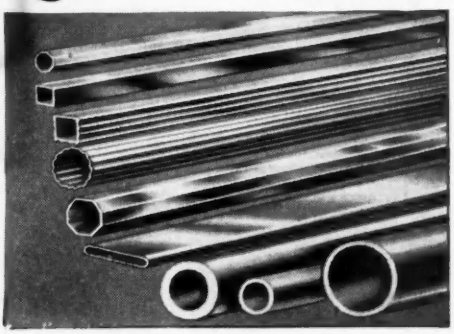
Serck TUBES



Serck Tubes are prominent throughout the electrical instrument component and accessory trade. Their versatility is in ever-increasing demand.

SERCK TUBES LTD.
Warwick Road,
BIRMINGHAM 11

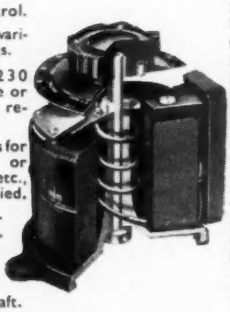




"VARIAC"
(Regd. Trademark)

Infinitely Variable
VOLTAGE regulating TRANSFORMER

Smooth control.
Linear scale, various markings.
115 or 230 volts service or others if required.
Special types for 500 cycle or 2,000 cycle, etc., can be supplied.
Low temperature rise.
Bench or panel type mounting, reversible shaft.

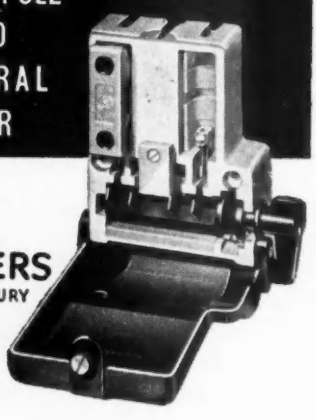


Reasonable overload capacity.
Output independent of load.
Single or duplex voltage outputs. (Type 100 RM/2B).
Supplied with or without screen. Ring-type laminated core.
The 'sectionalised' illustration shows Types 200 (580 and 860 va). Larger types are made-up to 7 kVA.

Write for Catalogue V549 for complete data

CLAUDE LYONS LTD
ELECTRICAL & RADIO LABORATORY APPARATUS, etc.
180 Tottenham Court Road, London W.1 and 76 Oldhall Street, Liverpool 3, Lancs.

SINGLE POLE AND NEUTRAL GEAR
by
SANDERS
WEDNESBURY



ALL-INSULATED SWITCH FUSE
WITH 15 AMP. FUSE
LIST NO. N.101G.

Nationally acclaimed as the most charming of lighting fitments, R.E.A.L. Plinth Lights have established such a wide appeal amongst home and flower lovers that their sales appear to be limited only by the amount of material available for their production.

Happily, we can announce that limited supplies are again available to the trade, and that these supplies are being dealt out scrupulously, with an impartial hand, and in strict rotation; all models being available.

AUTHORISED RETAIL PRICES (Tax Paid)

R.E.A.L. Plinth Light.
List No. 5000. Dia. 11½in.....40/-

R.E.A.L. Junior Plinth Light.
List No. 5002. Dia. 6½in. 30/-

R.E.A.L. Hotel Plinth Light.
List No. 5004. Dia. 11½in.....50/-

Each model supplied in a choice of hard-wearing enamel finishes; Pastel Cream, Pastel Blue, Pastel Rose, Gilt Lustre or Eggshell Black. With shock-proof porcelain lamp-holder, and three yards of two-core flexible cord.

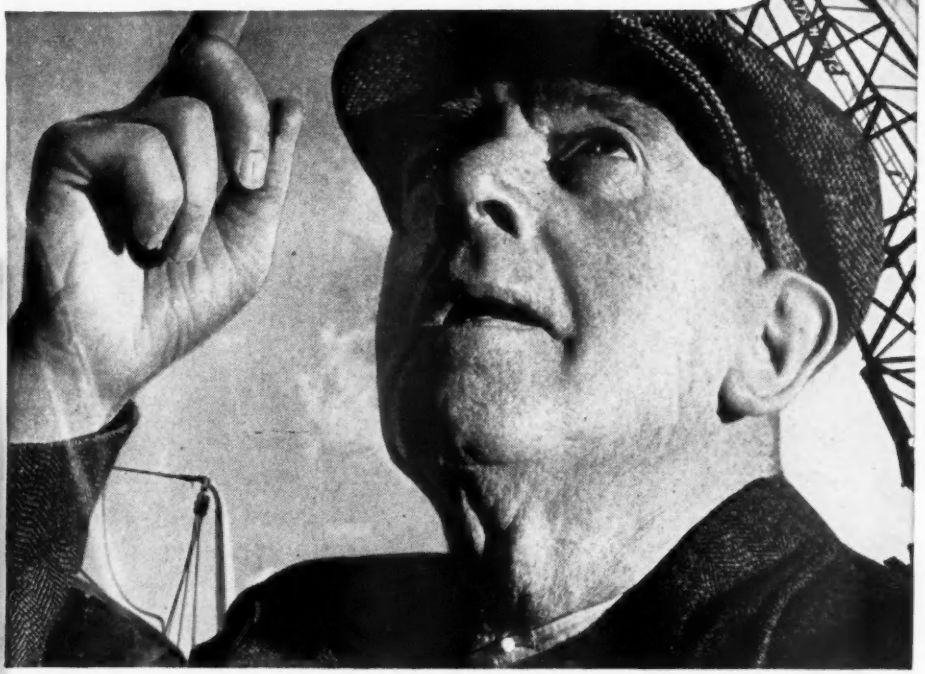
R·E·A·L
plinth lights

Please tell us if you require details of R.E.A.L. Plinths.

ROWLANDS ELECTRICAL ACCESSORIES LTD. R.E.A.L. WORKS, HOCKLEY HILL, BIRMINGHAM, 18

Tel: NORthern 2986/7/8 Grams: R.E.A.L. Birmingham.

The people everyone relies on . . .



Glasgow Corporation have relied on Tudor Batteries for 23 years. British Railways use them, too—so do, for example, W. H. Boase & Co. Ltd., on the dock quays at Liverpool. In fact, Tudor batteries are part of the success story of many different types of enterprise; a decisive proof, if any were needed, of their outstanding reliability.

The experienced engineering staff of the Tudor Accumulator Co. Ltd. will be pleased to prepare the most economical battery scheme to meet your requirements.

Tudor Batteries for

SWITCH OPERATING

EMERGENCY LIGHTING

TELEPHONE EXCHANGES

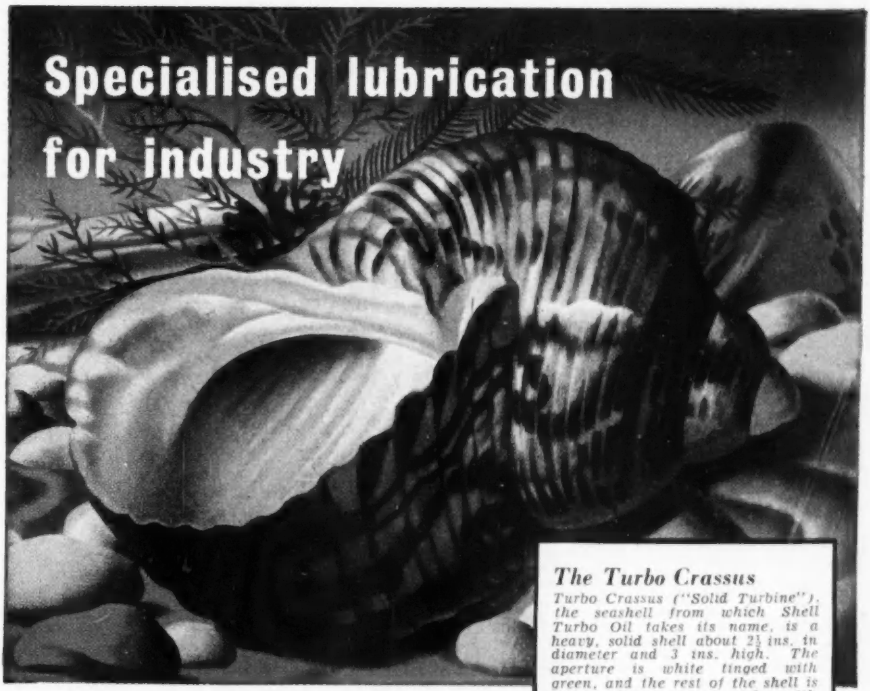
ELECTRIC VEHICLES

MARINE

T.111

Rely on Tudor BATTERIES

THE TUDOR ACCUMULATOR COMPANY LTD., 5 GROSVENOR GARDENS, LONDON, S.W.1



The Turbo Crassus

Turbo Crassus ("Solid Turbine"), the seashell from which Shell Turbo Oil takes its name, is a heavy, solid shell about 2¼ ins. in diameter and 3 ins. high. The aperture is white tinged with green, and the rest of the shell is dirty white or greenish, with angular black or brown patches on the ribs. Found off the coasts of North Australia and New Caledonia.

SHELL TURBO OIL

SHELL TURBO OILS are highly refined oils containing anti-oxidant and anti-rust additives. They separate readily from water during prolonged service and have outstanding oxidation stability. Available in a range of viscosities, they are recommended for steam, gas and water turbines, bearings of high speed enclosed crankcase steam engines, and certain other circulating systems where oils of turbine quality are required. Shell Turbo Oils are approved by all the leading turbine builders.

The wide Seashell range of specialised industrial lubricants is marketed in nearly every country of the world. There is a Seashell grade for *every* industrial use—and each is available everywhere in the same high quality.

SHELL **LEADERSHIP IN LUBRICATION**

WORLD-WIDE INDUSTRIAL RESEARCH

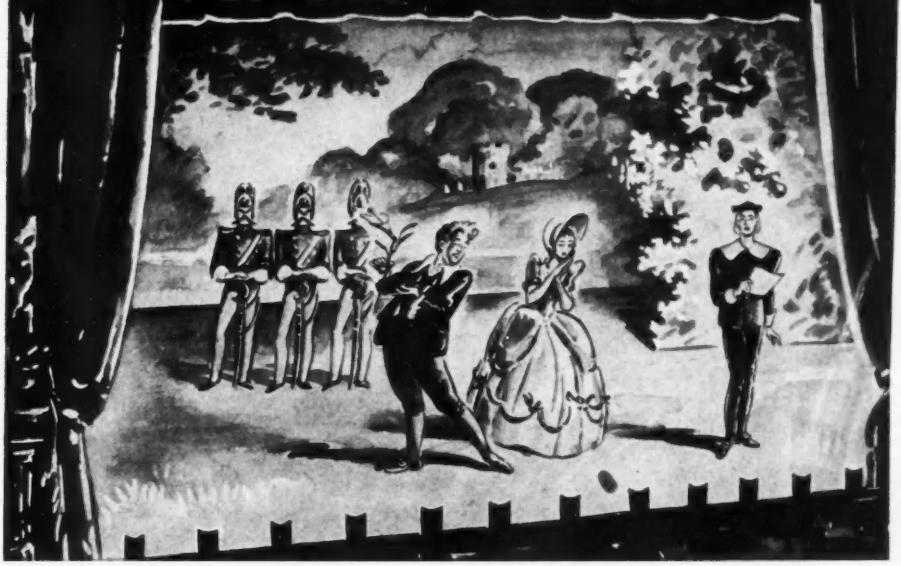
Seashell Oils are produced as the result of *world-wide research*. At Shell's great Thornton Research Centre, and at other Shell Research Centres in Europe and America, scientists and technicians spend their lives studying the special lubrication needs of every branch of industry. The rewards of this research are the Seashell oils—each developed to solve a *specialised* lubrication problem. This is the solid basis upon which Shell has built up its world-wide *leadership in lubrication*.

CALL IN A SHELL LUBRICATION ENGINEER

Shell Lubrication Engineers will be pleased to provide further information and to make specific recommendations for particular purposes. You can be sure of Shell lubrication—it is *specialised* lubrication.

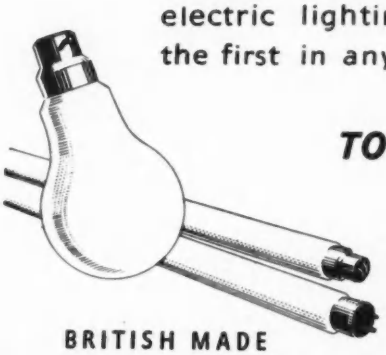
FBC
TRADE MARK
ALL-BRITISH
BALL AND PARALLEL-ROLLER BEARINGS
FOR EVERY PURPOSE
The illustration shows
one of the Rotax aero
engine starter motors
in which
F.B.C. bearings are used.
FISCHER BEARINGS CO. LTD.,
WOLVERHAMPTON
Subsidiary of British Timken Ltd.
Works : Birmingham, and Duston Northampton

HIGHLIGHTS OF THE LIGHTING WORLD



Seventy years ago-

on the 10th October 1881 - when the Savoy Theatre was opened with the Gilbert and Sullivan comic opera 'Patience'. SIEMENS provided the electric lighting installation- the first in any London theatre.

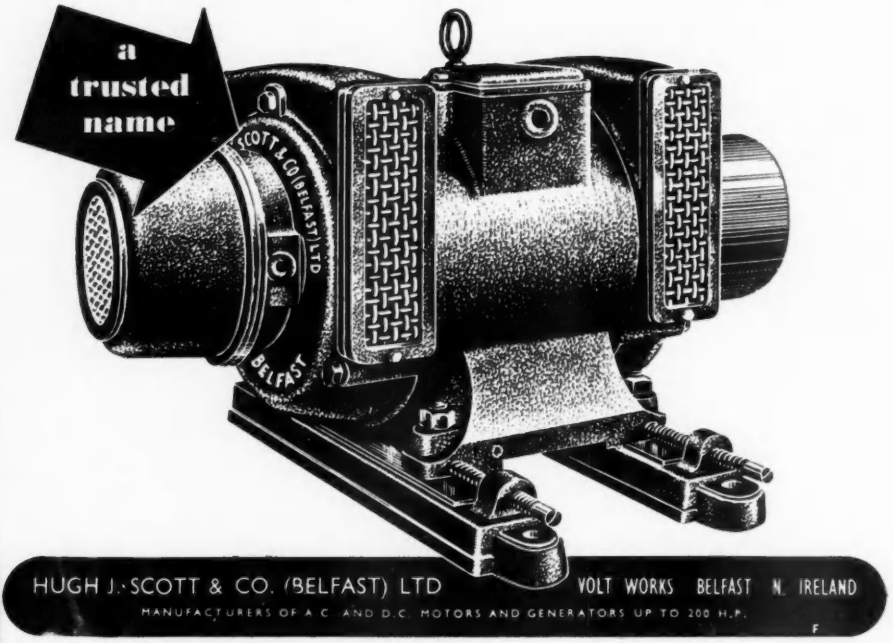


BRITISH MADE

TO-DAY

There is a SIEMENS Lamp for every Lighting Purpose

Advt. of SIEMENS ELECTRIC LAMPS AND SUPPLIES LIMITED, 38-39 Upper Thames Street, London, E.C.4
Branches at-Belfast, Birmingham, Bristol, Cardiff, Dublin, Glasgow, Leeds, Liverpool, Manchester, Newcastle-on-Tyne, Nottingham, Sheffield.



HUGH J. SCOTT & CO. (BELFAST) LTD VOLT WORKS BELFAST N. IRELAND

MANUFACTURERS OF A.C. AND D.C. MOTORS AND GENERATORS UP TO 200 H.P.

F

Swirlux washing machines have already proved themselves to be a popular favourite—but owing to the present situation, output is almost entirely taken up by export consignments.

Details of this latest Versco product are available from the sole manufacturers:

UNIVERSAL BOILERS & ENGINEERING CO. LTD.
Burnley, Lancs.

n.d.h.

The SIGN of Good Conduit

Advertisement of the
ASSOCIATION OF STEEL CONDUIT MANUFACTURERS
21 Waterloo Street
Birmingham 2

SPANNING THE GAP!

Power station engineering by Simon-Carves is helping to span the gap between electricity demand and supply.

This coal conveyor bridge over the Mersey at Warrington was built by Simon-Carves during the extension of the Howley Generating Station from 18,000 to 90,000 kW capacity. Four Simon-Carves boilers are in use and the fifth is under construction; Simon-Carves were also responsible for demolitions, foundations, new buildings and extensions, chimneys, ash handling plant and other associated work.

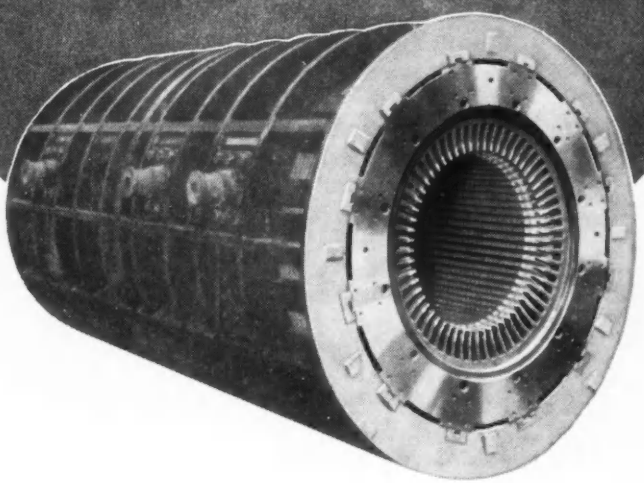
Steam power by **Simon-Carves Ltd** SIMON ENGINEERING GROUP

STOCKPORT ENGLAND

S.C.38

Leading Designers Specify—

NOMAG NON-MAGNETIC CASTINGS



When designing the alternators for the British Electricity Authority's power station at Stourport, English Electric Co. Ltd. engineers specified Ferranti Nomag for the Stator end clamps.

Because of its unique combination of qualities, Nomag has proved to be eminently suitable for this and innumerable other applications in the Electrical Industry.

Since discovering Nomag in 1925, the Ferranti foundry has produced thousands of tons of castings, all have the alloy's characteristics of –

High Specific Resistance	150 micro-ohms per Cm³.
Low Resistance Temperature Co-efficient	.00045 per °C.
Physical Toughness (Izod Value)	29 ft. lbs.
MAX. Magnetic Permeability	1.03 lines/Cm².

Good Machining Properties.

FERRANTI

LIMITED

FA 4

HOLLINWOOD · LANCASHIRE

London Office

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One sale often leads to another . . .

when you sell a SADIA

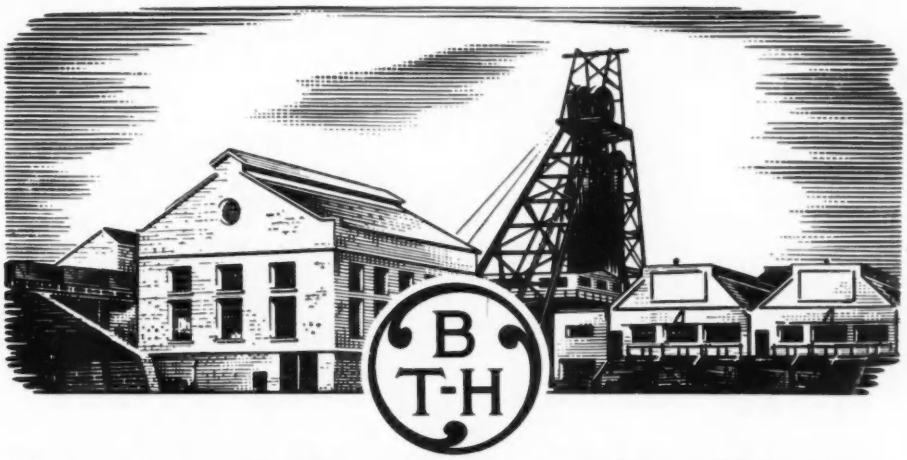
EVERY SADIA you sell goes out to be a salesman—for *you!* There's nothing more persuasive than hot water cheerfully gushing at the turn of a tap. Or more pleasing than the Sadia's clean, gleaming lines. Or more convincing than a Sadia owner's story of its trouble-free economical service.

Sadias are built to last. Some of the first ever made—twenty-four years ago—are still working merrily away. That's why there's never a "come-back" when you sell a Sadia. You'll hear no more of it—except from the owner's friends and neighbours, who'll want Sadias for themselves.

SADIA
HOT WATER BY ELECTRICITY

Write for full details of latest models to:

AIDAS ELECTRIC LTD., SADIA WORKS, ROWDELL ROAD, NORTHOLT, GREENFORD, MIDDLESEX



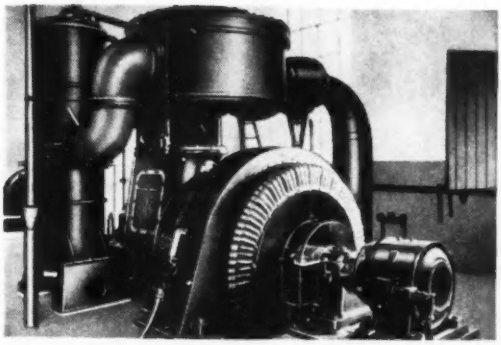
Electrical Equipment for Mining

Compressors

Where bulk electricity supply is brought to the mine, motor-driven compressors are usually employed and a reciprocating compressor driven by a BTH synchronous motor is an efficient and convenient arrangement much in favour.

For the larger demands centrifugal compressors are needed and BTH manufacture the complete unit comprising compressor of modern design and high efficiency with steam turbine or electric motor and speed increasing gears.

BTH have been installing equipment in mines for half a century, and one reason for their world-wide reputation is the extensive research undertaken into the requirements of the mining industry. Backed by unrivalled manufacturing resources, BTH is today taking a leading part in the supply of equipment for reconstruction and modernisation schemes both in this country and abroad.



One of two 550-H.P., 250 r.p.m., synchronous induction motors driving air-compressors in a Rhondda Valley Colliery.

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BRITISH THOMSON-HOUSTON
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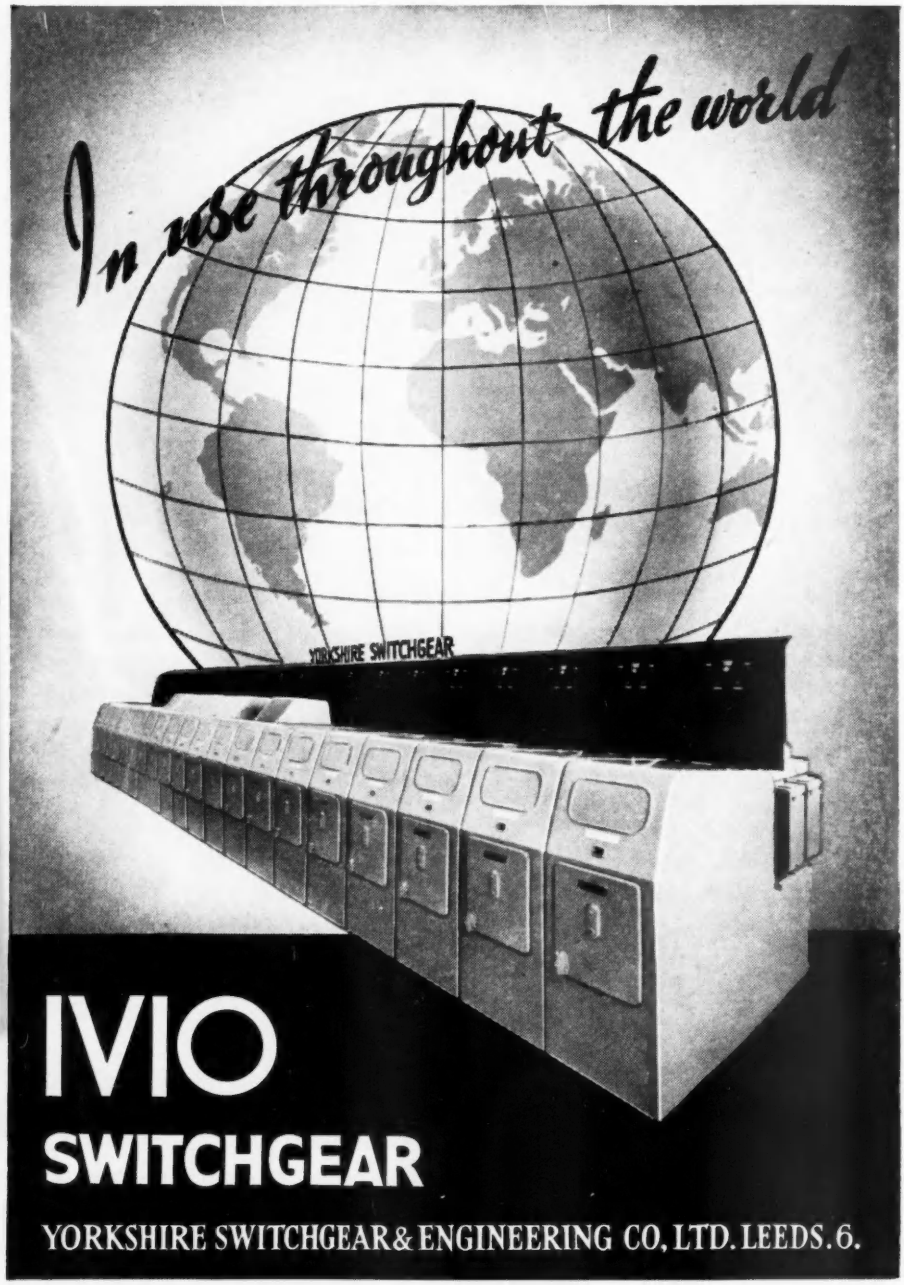

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BICC can supply all this . . .

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Overhead assemblies, line fittings and accessories.
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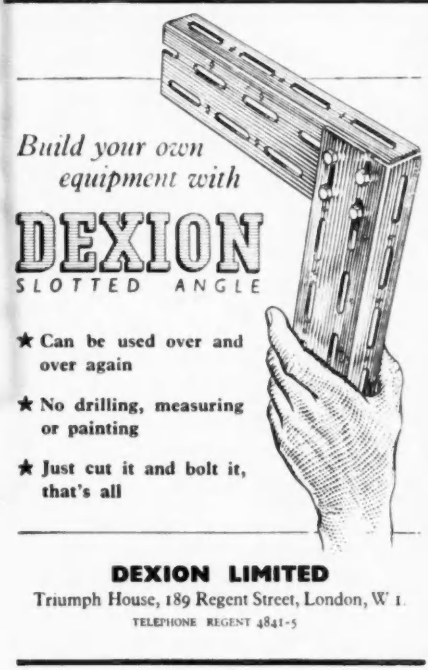
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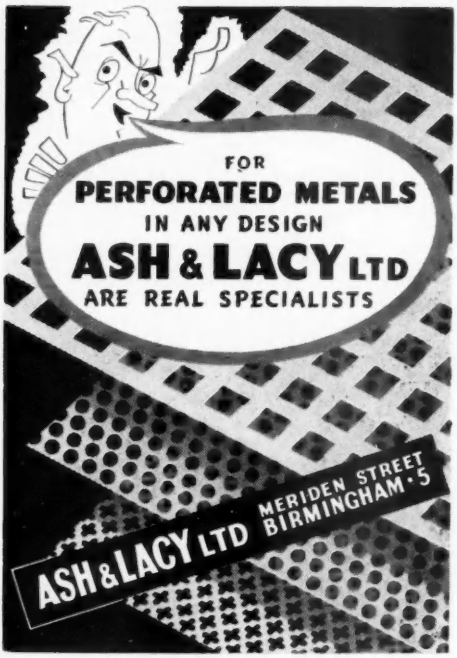
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- Instant Start Ballast, containing choke and starting transformer, is the first to operate lamps at nominal wattage.

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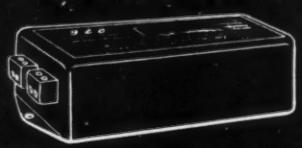

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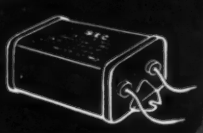
CAPACITOR



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High voltage air-blast circuit-breakers for outdoor service

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Tested for breaking charging currents of long lines

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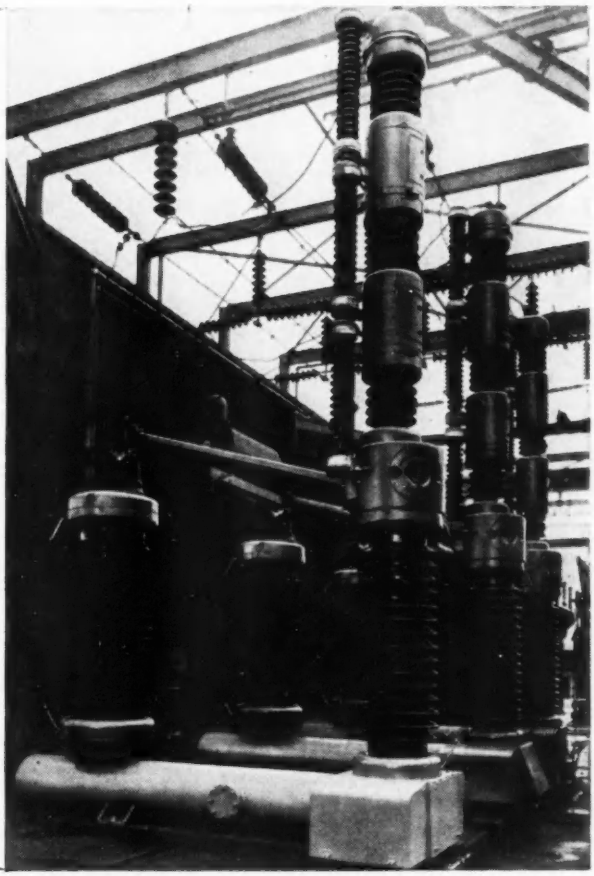
Illustrated is a 165-kV, 3,500-MVA air-blast circuit-breaker recently tested for breaking line charging currents at Fontenay, France.



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QUEENS HOUSE, KINGSWAY, LONDON, W.C.2.

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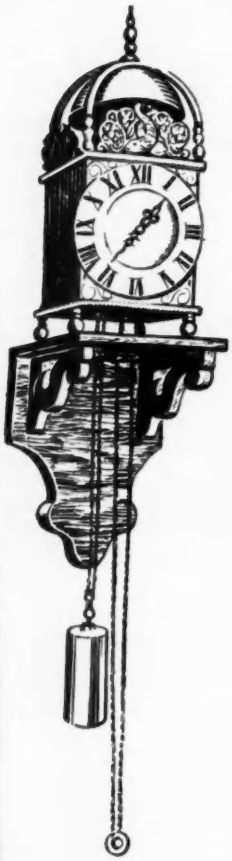

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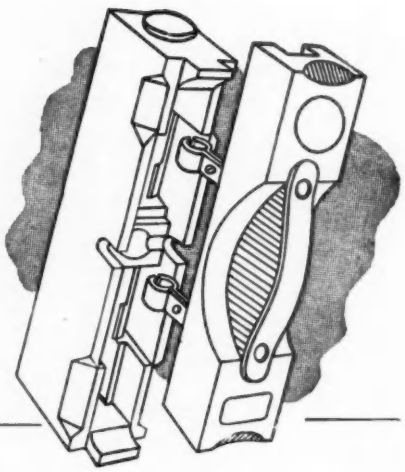
"Continuous Reliability" is exemplified by Old Cromwellian Lantern Clocks which have kept good time through the centuries. Even so, they are no more dependable than Slydlok Fuses, which you can rely upon to withstand arctic or tropical conditions, to fix into the most awkward positions, and to stand up to the severest forms of vibration, or sudden concussion. There are two types of Slydlok Fuse, the popular "X" type (5-60 amp) and the more recent "G" type (15-100 amp), which includes spare fuse wire in each holder and accepts HRC Cartridges. Write today for full details.



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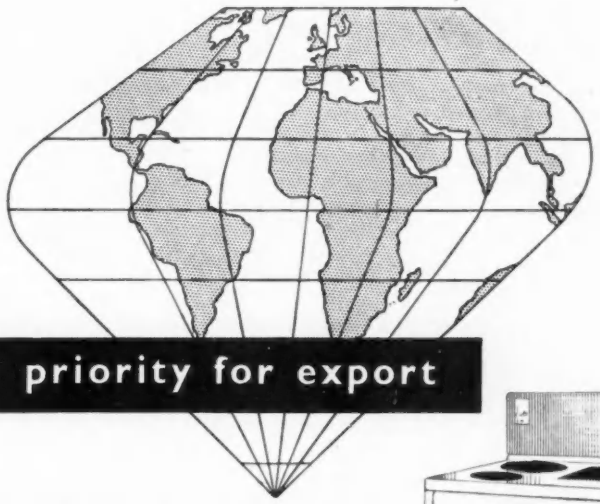

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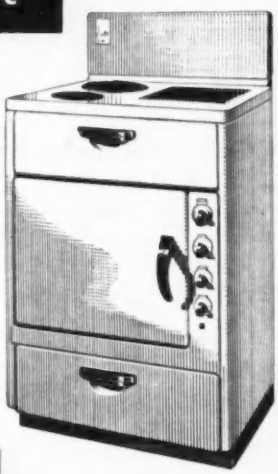

Creda Cookers are in short supply at home because housewives **everywhere** are choosing Creda. Never before has the House of Simplex exported so many of these famous cookers
And never before have these exports been so necessary to the nation's good

Creda

electric cookers

made by the House of Simplex

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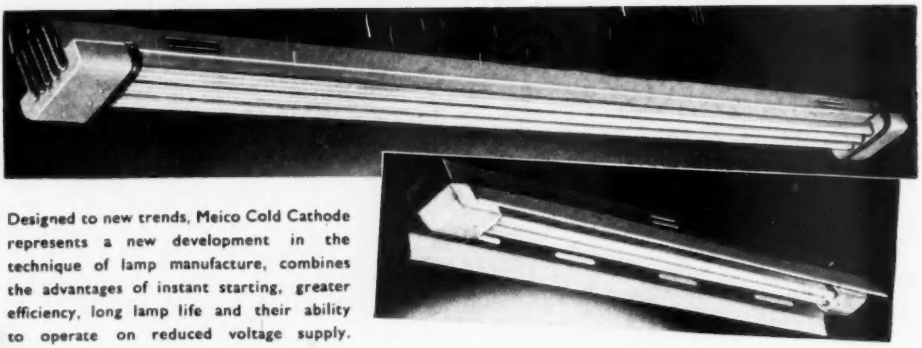

Designed to new trends, Meico Cold Cathode represents a new development in the technique of lamp manufacture, combines the advantages of instant starting, greater efficiency, long lamp life and their ability to operate on reduced voltage supply.

A comprehensive range of Industrial, Commercial and Decorative fittings and combination of "U", Grid, Straight and Curved tubes. Illustrated and informative catalogues available on request.

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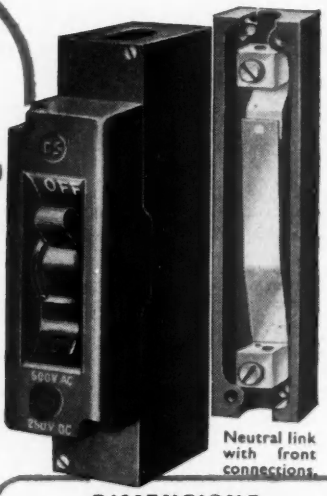
Introducing **DORMAN *MINIATURE* CIRCUIT BREAKERS**



Neutral link with front connections.

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5" Length x 1⅛" Width x 3" MAXIMUM PROJECTION

TESTED BY THE NATIONAL PHYSICAL LABORATORY
Designed to give unfailing protection to all types of electrical circuits and equipment up to a maximum current rating of 50 amps at 500 V a.c. or 250 V d.c. On ordinary overloads tripping may be instantaneous or have an inverse time delay characteristic, but in all cases instantaneous tripping occurs on a large overload or short circuit. The mechanism is normally sealed to prevent interference with settings. Neutral mechanism designed as a separate unit, to be fitted underneath the main unit when required. Tested rupturing capacities 10,000 amp at 250 V d.c., 10,000 amp at 440 V a.c. at pf. 0.62 lag.

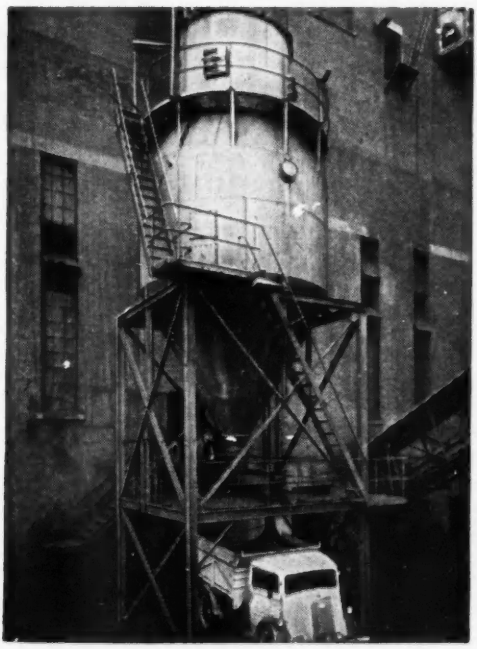
Write for illustrated folder M.C.B.

ORDSAL

DORMAN & SMITH LTD · MANCHESTER · 5

FLUE DUST AND RIDDLINGS

EXTRACTION PLANT



● The Nation's need demands that Coal shall convert every possible fraction of its energy into power for production. The vital contribution that efficient combustion makes to this end is immeasurably facilitated by B.V.C. Flue Dust Removal Plant. This is the recognised method of keeping steam boilers free from accumulations of flue dust, and ensuring that every ton of coal is used to the best possible advantage by removing and consuming the riddlings.

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(Subsidiary of the British Vacuum Cleaner and Engineering Co Ltd.)

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Whatever the country,
whatever the climate...

always specify

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Standard Telephones and Cables Limited

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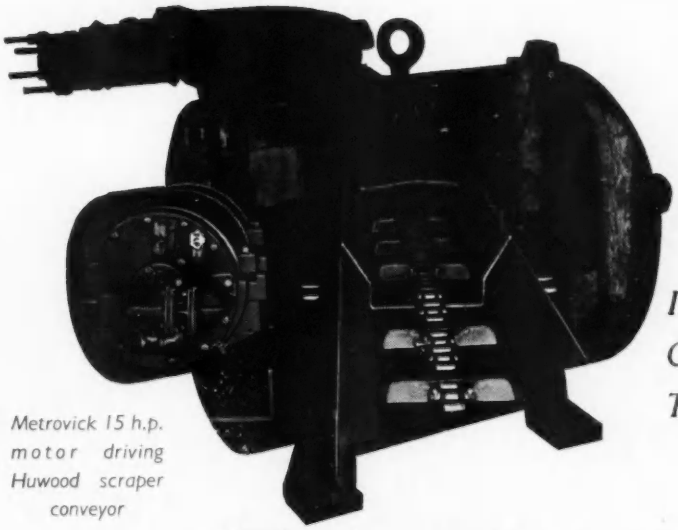
POWER LINE DIVISION: North Woolwich, London, E.16 · ALBert Dock 1401

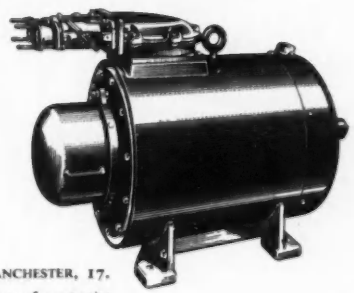


Metrovick 15 h.p. motor driving Huwood scraper conveyor

IN THE COAL WORLD THEY SAY . . .

"That's good, it's an M-V Motor"

Compliance with electrical specification and safety regulations can be taken for granted in an M-V motor. Metrovick design and build motors for every electrical use in coal mines from cutting to cleaning. The advantages of M-V machines go beyond specifications and regulations. Their reliability is built-in and it is as comforting to the user as to the designer to have the advice and service of M-V engineers who really understand the electrical problems of other industries.



A "Metrovick" 30 hp totally-enclosed fan-cooled Flameproof Motor for use underground in mines.

METROPOLITAN-VICKERS ELECTRICAL CO. LTD., TRAFFORD PARK, MANCHESTER, 17.
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METROVICK *Motors for all Industrial Drives*

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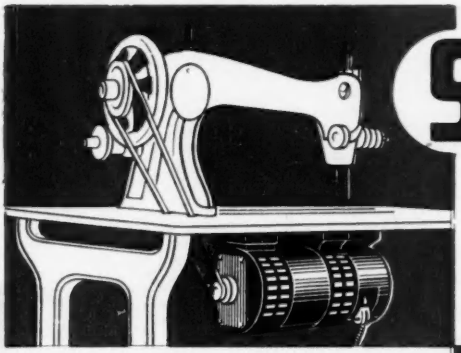

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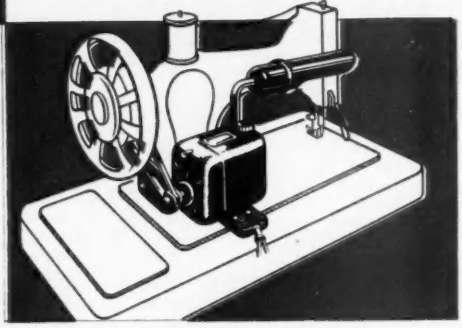
MOTORS

1/15 H.P. A.C./D.C.

Motor started and controlled by light pressure on foot control pedal, leaving both hands free. No fatigue

Needle light fitted on motor to relieve eye strain.

Running cost negligible. Retail price £5 14s. plus 25/4 P.T.



"MONOBLOCK" Trade Sewing Machine Motor.

Entirely new design.

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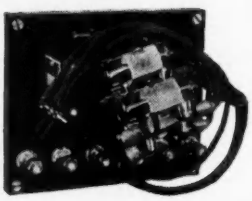

- *Silent*
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Available at all voltages and currents A.C. or D.C. up to 75 amp. single or double pole. 50 amp. triple pole. Also, voltage and current sensitive relays, time-lag relays, mercury switches, adjustable and preset electric-contact thermometers.

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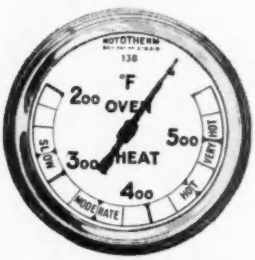

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ACCURATE TEMPERATURE AT A GLANCE

The clear dial, robust construction and high degree of accuracy make this specially designed Oven model the best of its type available. Write for Catalogue "Modern Thermometry" which gives details of models for indicating, controlling and recording temperature.

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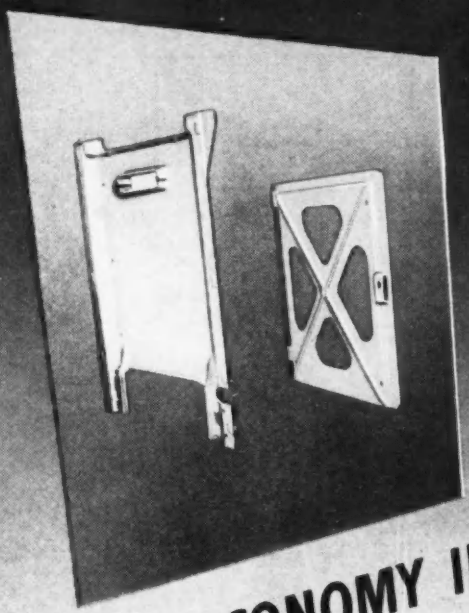
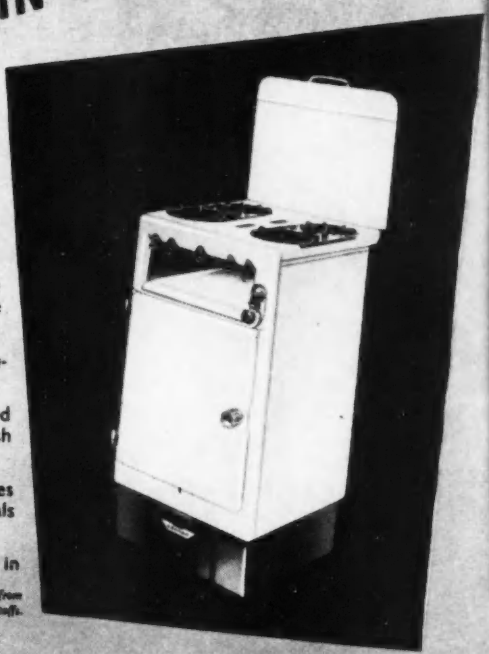


CASTING OPERATION

FOR ECONOMY IN FINISHING COSTS



The illustration shows aluminium die-castings comprising the Back Frame and Door Frame of the "Cannon" Gas Cooker. Our customers say: The main advantages of using aluminium die-castings can be summarised as follows:—

1. Reduction in overall weight of the Cooker which permits of the greater use of women labour in assembly.
2. The elimination of spray painting usually necessary to prevent corrosion.
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4. Easy machinability, especially in cases where the machining of other materials is an expensive process.
5. Greater dimensional accuracy in casting.

Extract from a letter from Messrs. Cannon Iron Foundries Ltd., Bilston, Staffs.

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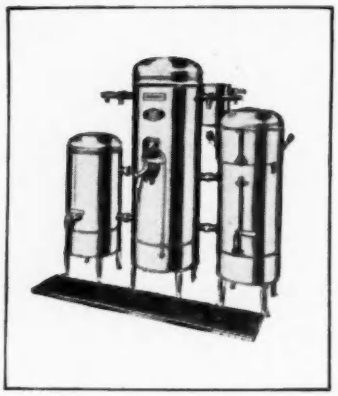
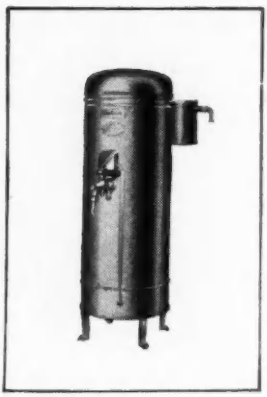
BIRMINGHAM ALUMINIUM CASTING (1903) CO LTD

BIRMID WORKS · SMETHWICK · BIRMINGHAM 40





The meaning of craftsmanship

What do we mean when we say that a 'Jackson' is craftsman built throughout? Not only that the men who make it are highly skilled at their trade, but that from the arrival of the materials at the factory to the dispatch of the finished machine, all possible care is lavished on every detail of construction and finish.

No trouble or expense is spared; nothing is left undone. And that's why a Jackson boiler is not only the best you can buy but the cheapest in the long run, as well.

Jackson Boilers Ltd.

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The 'Jackson' Care and Maintenance Service is an invaluable safeguard

Showrooms:

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SPOTLIGHT ON POWER CUTS

VENNER INTRODUCE NEW TIME SWITCH WITH 8 HOUR SPRING RESERVE

SMALL, COMPACT, FITS INTO ANY STREET LIGHTING COLUMN

ENTIRELY AUTOMATIC & INDEPENDENT OF MAINS SHUT-DOWNS, NEW T.J.S.P. ELIMINATES NEED & LABOUR COSTS OF CONSTANT RE-SETTING

- ★ New T.J.S.P. Switch unaffected by variations in frequency.
- ★ Large and newly designed cam operated solar dial gives accurate setting to true solar time.
- ★ Automatic synchronous motor winding mechanism maintains minimum reserve of 8 hours—ample cover for all normal power cuts.
- ★ Single pole metal air-break contacts, rated at 20 amps. up to 250 volts A.C.
- ★ Plug-in design. Switch unit may be removed and replaced on site without disturbing wiring or dust-proof box.
- ★ New T.J.S.P. Switch particularly suitable, by Authorities concerned, for peak period cut-off of immersion heaters and other high wattage equipment.

AND COSTING ONLY £9.15.0!

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This new switch is a culminating point of 50 years of Horological experience

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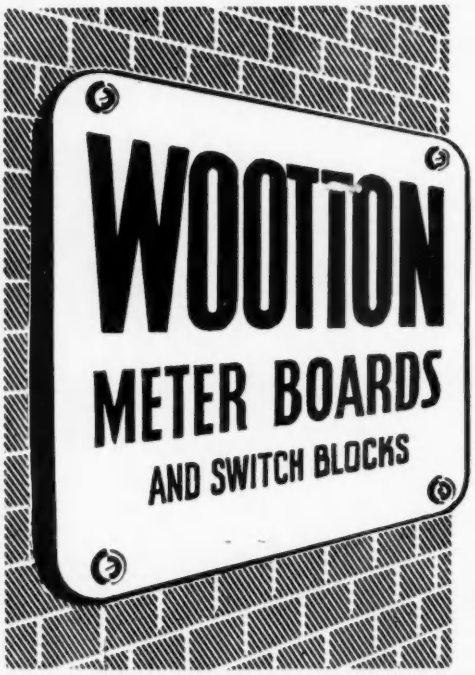
'It's time you switched to VENNER'



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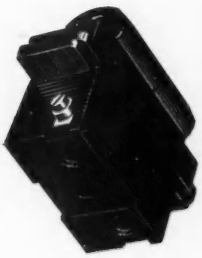

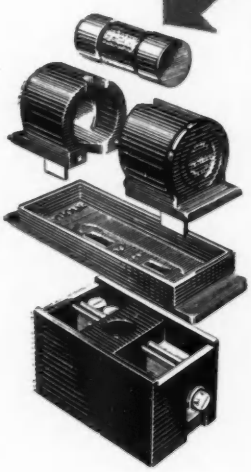

. . . And who should know it better than Reyrolle who make some of the world's largest switchgear for arduous service. The same care and attention that we lavish on large equipment is spent in producing the less spectacular, but just as useful, accessory electrical equipment. Fuses, switch panels, plugs and sockets — little things maybe, but things that call for accuracy in their manufacture. Reyrolle equipment is nothing if not accurate.

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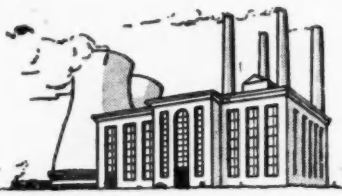

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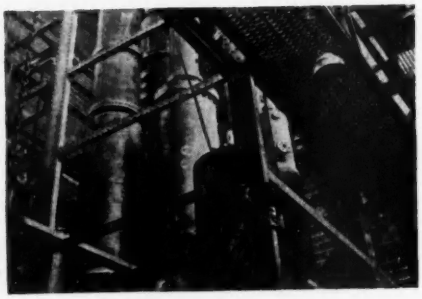

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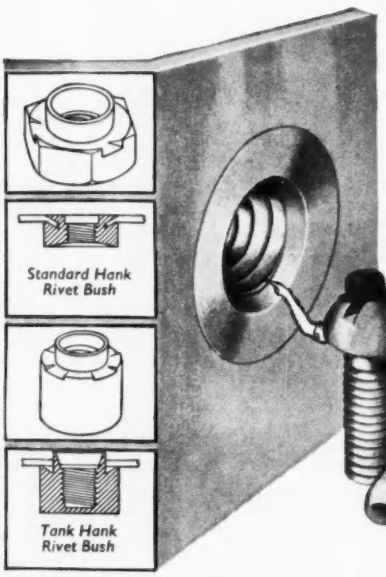

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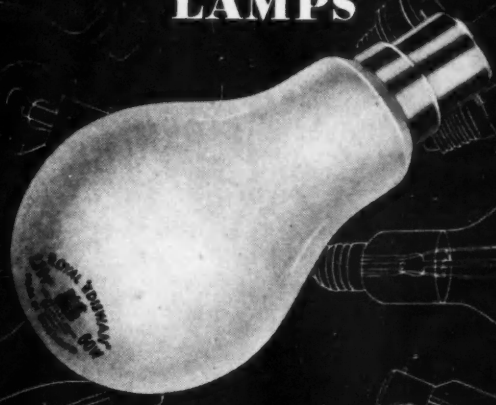

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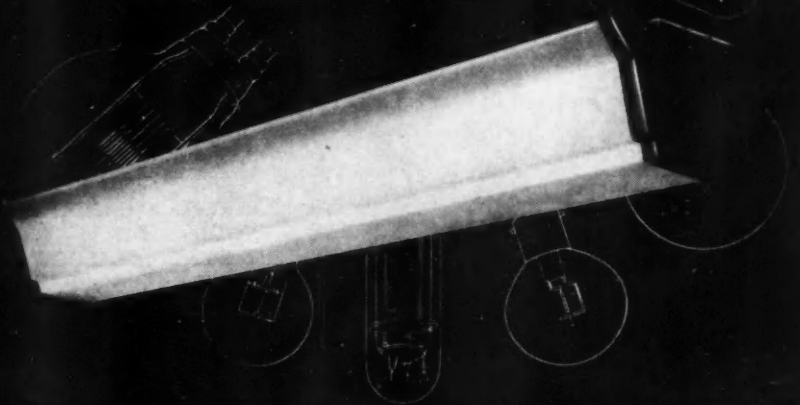

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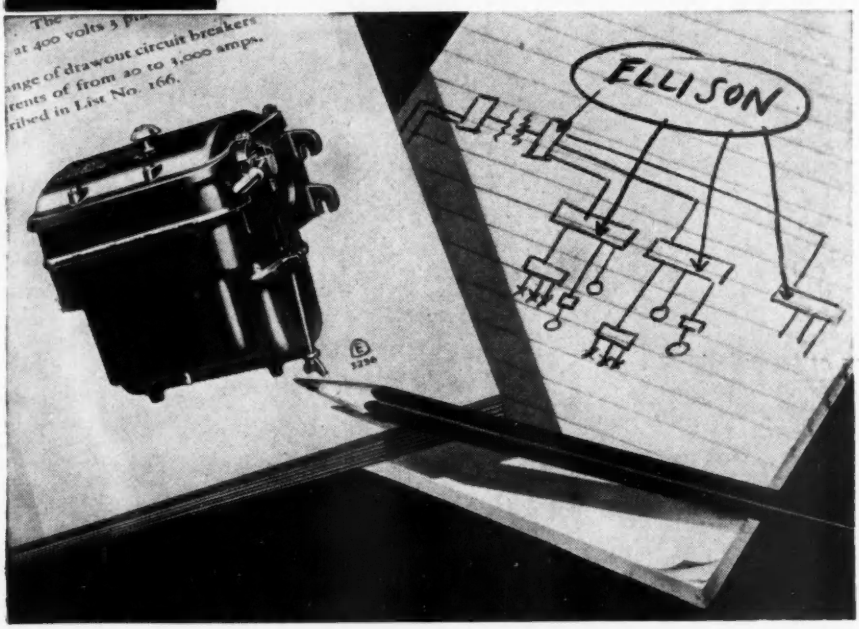

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ELECTRICAL TIMES

Vol. 120 No. 3131 THURSDAY, 8 NOVEMBER, 1951

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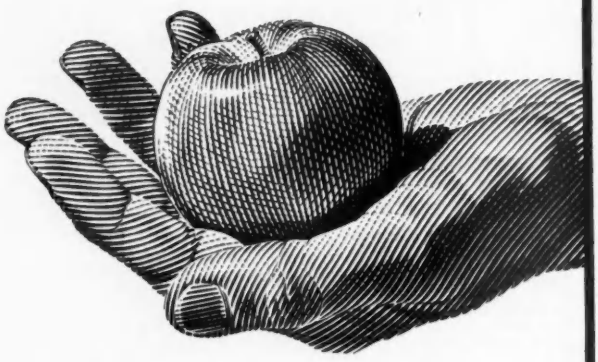

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Editorial

THE NEW MINISTERS

THE appointment of Geoffrey Lloyd as Minister of Fuel and Power is one which was commonly expected, and there will be few who will find fault with it. A surprise move, however, has been the creation of a co-ordinating minister of Cabinet rank who might effectively be called the Minister for Nationalised Industry since his ambit will embrace both transport and the fuel and power industries. In effect, therefore, there will be two ministers overlooking the actions of the B.E.A. and how this will work in practice remains to be seen. It does provide a higher status of representation in the Cabinet, on the other hand there may be some slowing down in the obtaining of decisions consequent upon the two levels of control. Lord Leathers, who occupies the senior post, however, has a background of transport rather than fuel, and as our railways are in dire need of the closest and most urgent attention it may well be that the supply industry will not suffer from undue government interference for the time being. But should the present government last the full span of five years there is every probability that an amending Electricity Bill will be introduced; indeed the King's speech this week forecast the promotion of greater flexibility in our Industry,

A BETTER START

APPROPRIATELY, perhaps, the flames of Guy Fawkes bonfires serve as a reminder of the end of the coal-stocking summer. The year 1951 began with the most serious fuel shortage since 1947; what is the outlook for the winter now with us? From the February low point of 2·5m tons, stocks at power stations have been built up to an end-October total of 5·3m, clear evidence of the success of efforts made during the summer to give the B.E.A. a clear run this year. This is sufficient coal for generating 8,700m units, or some six weeks supply at winter demand, and compares with the five and a half weeks reserve available last year Examination of the statistics over the whole range of coal utilisation, however, shows that this comparatively satisfactory story is repeated nowhere else. Total distributed stocks, at 16·7m tons, are 1·4m tons up on 1950, but of this increase fully 1m tons has gone to the power stations. This assignment of over 70% of increased stocks to our industry is a just recognition of the part it has to play in the push for more production, but it holds a warning that coal is otherwise going to be in short supply.

PROOF IN FIGURES

THIS matter of coal stocks is developed from the household users' viewpoint in a statement issued last week by the Coal Merchants' Federation of Great Britain. Much in this document is a fair warning of possible hardships and an acceptable plea for co-operation, but yet another unfair treatment of the electric fire problem is included to bias the public and persuade unwary politicians that the electric radiator is an unqualified nuisance. As at the recent Combustion Engineering Conference, the tactics adopted are to condemn the fire for its contribution to the peak demand, and to administer a final blow with a comment on the quite separate matter of its alleged inefficiency for continuous "space heating." As a first step in countering this misleading propaganda, the supply industry and the manufacturers must combine to stamp out of use that quite inaccurate phrase, and they should extend their alliance to produce an aggressive answer to these advocates of a fuel policy so distorted in favour of the solid fuel supporters. It should be made clear to the people of this country, that if abolition of the electric fire, or some similar policy is to be accepted, those advocating such a step must show that a worth-while saving of coal will result. And they should be told that the possible yearly saving is limited to the difference

between 3·5m tons of low-grade fuel, which is what the industry burns to supply electric fires, and the equivalent amount of good quality coal which must be stoked on domestic fires and stoves. Let the case be fought on those figures.

SQUEEZING THE LEMON

ALTHOUGH the use of capacitors or synchronous motors to improve the power factor of a consumer is comparatively commonplace, the use of large banks of capacitors located at scattered points within a system to provide better voltage regulation and increase the carrying capacity of lines supplying that area, is unusual in this country. For this reason the work being done by the South Wales Area Board and the Division is of considerable interest. Admittedly the circumstances prevailing in the Area are not general, and the installation has been provided on a stop-gap basis until local generating plant becomes available. But the use of the capacitors will not be ended then. They will remain at the disposal of the Board for installation wherever voltage regulation becomes troublesome, and that problem will long be with us. Economically, therefore, as well as electrically, the scheme has much to commend it, and any contribution to alleviating the power shortage, which is frequently more local than general, is to be welcomed.

THE INDEPENDENT HIGHLANDS

THERE is often heard the suggestion that the two Scottish electricity boards should be merged with the North of Scotland H.E. Board to form one single authority for Scotland. Not infrequently such suggestions come from supporters of the Scottish Nationalist movement, and in consequence it sounds the more surprising when a forthright denunciation of any such proposal comes from a Scot. It would spell disaster for the Highlands, was the view Mr. Tom Johnston expressed last week. This is no mere perpetuation of the highland-lowland viewpoint. The lowlands, with their electrical economy based on coal, are of a kind with the English boards. On the other hand the North of Scotland Board was conceived less as an authority to exploit economic hydro power but more as a means of rehabilitation of the Highlands. Several of the water power schemes which have been launched have been uneconomic in themselves, and will be subsidised from sales to the B.E.A. of electricity from more profitable schemes. Whether events will prove this to be a satisfactory arrangement is by no means certain. Since the rosy optimism of the Hydro-Electric Development Act of 1943, there have been second thoughts on the matter, and this is evidenced by the amendment of the 1947 Act which requires the whole matter to be reviewed before 1953, with ministerial power to make changes in the basis of payment specified in the 1943 Act. While the present split up of the territories is to be preferred, as Mr. Johnston advocates, it would be unfortunate if over-development of uneconomic schemes should necessitate an indirect subsidy for electricity supply to the Highlands in addition to the other assistance being given.

OUTCASTS

THE sympathy of all engineers must go out to those colleagues in the Middle East who have been peremptorily dismissed from their posts for no other reason than the nationality they are proud to bear. Many have given a lifetime of service, and have played a part in building the great engineering assets of those nations, only to find themselves outcasts as a result of action by governments lacking both sensibility and gratitude. This rabid nationalism must come as a shock to all engineers, for they, of all men, have achieved that true international outlook which alone can rid the world of the national hates and fears which are the breeding ground of war. Therefore, let those engineers view in sorrow rather than in anger their work becoming the catspaw of unscrupulous politicians, knowing full well that it will be the countries concerned that will suffer in the end. And in their return to this country, let us hope that all engineers will give them the welcome they deserve.

Meteor

Capacitors in South Wales

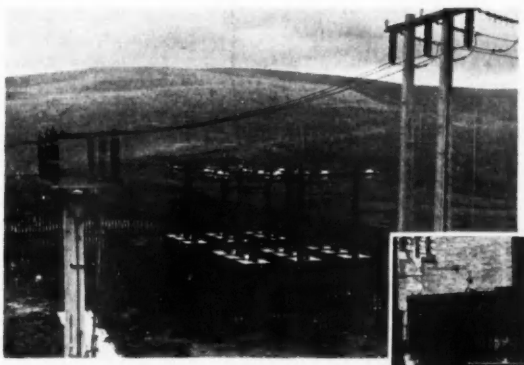
Steps being taken to increase line capacity and improve voltage regulation

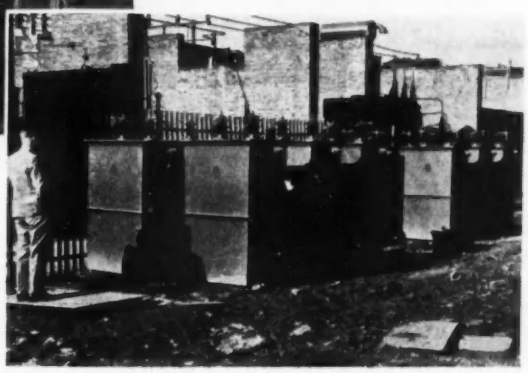
ONCE a depressed area, South Wales is now one of the most comprehensively industrialised parts of the country. Heavy industry as represented by such projects as the Margam Steelworks, Rogerstone Aluminium Rolling Mills and the collieries, and light industries exemplified by Hoover's Works, British Nylon Spinners and Treforest Trading Estate, have been established in a comparatively small area. Despite the consequent shortage of labour this process shows little diminution. As can only be expected, the demand for electricity in the Area is rapidly increasing, and this is causing considerable anxiety both to the Generating Division of the B.E.A. and the South Wales Electricity Board.

In order to appreciate the difficulties confronting these two bodies the following brief analysis of the situation is given. Firstly, the annual increase in demand is in excess of the average over the country due to the installation of large individual blocks of industrial load. In 1949/50, it was as much as 16·5%. As a long term policy, this increase will be dealt with by the establishment of two new large power stations—Uskmouth and Carmarthen Bay—both of which are well in hand. The former, due to have an installed capacity of 360 MW, should go on load sometime next year, while the latter, with an ultimate capacity of 345 MW will follow a few months later. In the meantime, the load increase must be made up by importing power over the Grid.

Second, the load characteristics are somewhat unusual. Owing to the large amount of continuous process work and the fact that the ratio of industrial to domestic consumers is abnormally high, there is a comparatively small difference between the summer and winter peak. As a general rule, it can be stated that the summer peak is approximately 90% of the previous winter's peak. Apart from making overhaul and maintenance of the existing plant within the area extremely difficult, this implies that the summer importation frequently exceeds the winter importation when essential overhauls are carried out.

Finally, the physical layout of transmission and distribution systems is such that at times of heavy loading the voltage regulation over both the 132 kV and the lower voltage lines becomes bad, and at certain parts of the system voltage drops of considerable magnitude are experienced.





Above is a general view of one of the capacitor installations and on the right is a close-up view of a bank prior to connection

132 kV System

On the 132 kV system, four lines connect the Area with the main Grid system. Two of these run from Gloucester to Upper Boat via Ebbw

Vale; one runs from Gloucester to Upper Boat via Newport and Cardiff, and one from Portishead to Upper Boat via Lydney and Cardiff. Owing to circumstances arising outside the area, the greater part of the power is transmitted over the Gloucester-Upper Boat lines, and owing to voltage regulation difficulties these cannot be worked at full capacity.

Short-term Solution

The Electricity Authorities were thus faced with the problem of improving voltage regulation and increasing capacity as a short term policy, pending the commissioning of Uskmouth and Carmarthen Bay. The most satisfactory answer, taking into consideration the time factor, was to provide leading kVAr within the area, which would improve the power factor, allow the lines to transmit a higher proportion of "wattful" power and improve the voltage regulation of the system. A study showed that the provision of one kVAr leading would permit the importation of approximately one extra kW.

Accordingly, it was decided by the British Electricity Authority to install 30 MVAr of capacitors in the Area in 1951, the capacity, for convenience, being split fairly evenly between the Divisional and Area Board systems.

The obvious places for the Division to locate their capacity were at substations where there already existed step-down transformers from the 132 kV system. Two sites were selected, one at Kenfig and the other at Llanelly. Each of these sub-stations possesses two 132/33 kV transformers, and the capacitors are connected in units of 3·75 MVAr to the 33 kV side of these transformers. These four units together comprise 15 MVAr. The units at Kenfig, due to be delivered shortly, are to be 3-phase units made by Bryce Ltd., while those at Llanelly are single-phase units, connected in star and manufactured by B. I. Callender's Cables Ltd.

Board's Installation

The Board, however, decided to install 4·5 MVAr at 33 kV and 10·5 MVAr at 11 kV at substations on their network. Thus at Caerau substation 4·5 MVAr are on the secondary side of a 66/11 kV, 12 MVA Fuller transformer; at Pyle 2·25 MVAr is to go in on the 11 kV side of a 10 MVA 33/11 kV transformer; at Llynfi two banks of 1·5 MVAr are to be connected on the secondary sides of two 8 MVA distribution transformers, and near Swansea 0·75 MVAr are to be connected on the l.v. side of a 33/11 kV 4 MVA transformer. The remaining 4·5 MVAr is to be installed at three or four substations where found convenient.

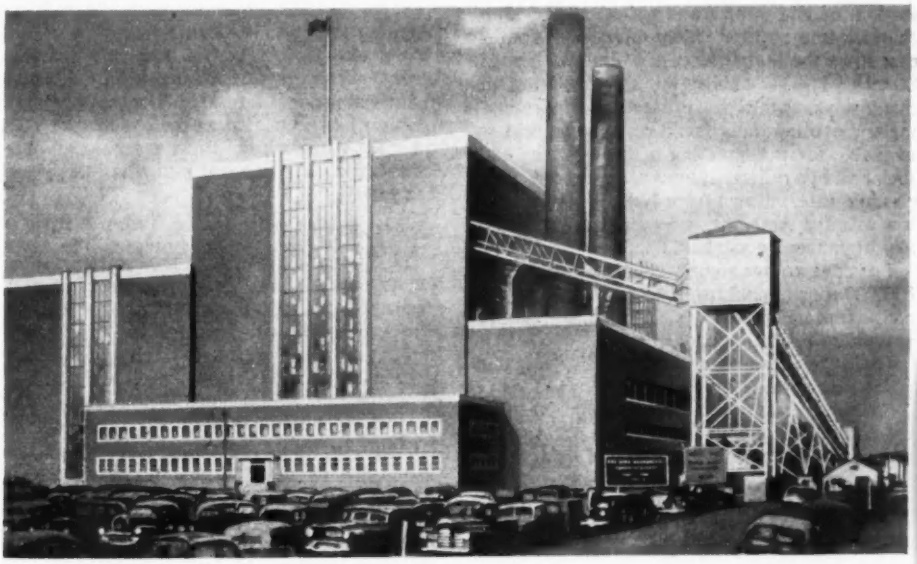
As far as the Board is concerned, the problem is an Area one, and the actual siting of the capacitors is not critical. The main criteria adopted for the locating of the installations were: first, the substations concerned had to possess sufficient physical space for the capacitors; second, the transformers with which the capacitors are associated had to be of fairly large electrical size compared with the capacitor so that the leading MVAr could be fully utilised, and finally, the transformer light load had to be such that the voltage rise consequent on the installation of the capacitors did not become excessive, nor would the p.f. go over to leading.

Protection

As all the capacitors fall within the protection zone of the associated transformer, extra protective equipment has been cut to a minimum. The capacitors are connected in star and the star point isolated from earth. In order, however, to afford protection from internal earth faults the capacitor casing is earthed through a frame leakage relay designed to operate at 0·7 amps. Short-circuit and overload protection is provided to a certain extent within the capacitors themselves, the B. I. Callender's units having h.r.c. fuses, while Buchholz protection is fitted on the Bryce units. Both frame leakage and Buchholz protection operate the circuit-breakers on the h.v. and l.v. sides of the transformer. Normal switching operations are arranged so that the initial energising of the transformer and capacitors is done from the h.v. side, as is also the final de-energising. This has the advantage of interposing the transformer as a buffer to prevent surges. The l.v. winding also acts as a discharge resistance.

In conclusion it should be remembered that these installations are not intended to be permanent, and therefore the method of connection and general arrangement is somewhat of a temporary nature. When Uskmouth and Carmarthen Bay come into operation, the immediate reason for their installation will vanish. This does not, however, mean that the capital expended will be lost; on the contrary, they will be then moved to other parts of the country where trouble is being experienced pending network reinforcement, or where the power factor of the load is inherently bad, and will thus continue to make an effective contribution both technically and economically to the national economy.

Canada's Steam Plant Expansion - - - Toronto



Opening of the RICHARD L. HEARN *Station*

THE opening, by Premier Frost last week, of the first unit in the Richard L. Hearn generating station on Toronto's eastern waterfront marked a significant milestone in the history of British engineering progress. The importance of this ceremony is due to the fact that the machines, ordered from C. A. Parsons and Co., Ltd., are probably the biggest two-cylinder tandem sets ever built in this country.

It is, in a way, ironic that the largest steam station in Canada should be erected for the Hydro-Electric Power Commission of Ontario, but several factors made the decision to use steam desirable. Of these, probably the most important is the fact that suitable hydro sites are a considerable distance from the heavy load centres, and a second vital point was that energetic steps had to be taken to meet the rapidly increasing load in the area. Another point which will have considerable bearing on the future of steam in Ontario is the outcome of present deliberations between Canada and the United States on the utilisation of St. Lawrence power. For this reason, although the Richard L. Hearn station was originally planned for six units, it is hoped that four only will be required.

The actual opening was performed by Richard L. Hearn who "pressed the button" starting the station. Over two thousand people, including government representatives, business, and the 1,200 workmen who built the station were present. Robert Saunders, chairman of the Hydro Electric Power Commission in his speech said that although steam was costly, the need for power was so urgent that the plant was a necessity. Even with the opening of two more plants this year, and others in the near future he added, Hydro can only meet expected needs for a few years. After that everything depended on the St. Lawrence seaway.

The Premier declared that when Hydro's $880,000,000 expansion programme was finished it would not provide the answer. Referring to the St. Lawrence project he said that Ontario was prepared to end talks with the United States. "In partnership with the Government of Canada we are prepared to go on alone. We would like the United States to come in; but if they don't then we wish they would continue the good neighbour policy and stand aside and let us get on with the St. Lawrence."

Station Site

The station site itself is located on the eastern section of the waterfront south of the ship channel, and approximately three miles south-east from the intersection of Fleet and Yonge Streets. This is almost an ideal position in many ways, as it provides excellent coal receiving and cooling water facilities. A large dock is available for the handling of heavy plant and fuel, and two railway sidings are provided. The cooling water, drawn from Lake Ontario, is of low average temperature leading to an unusually high average vacuum.

For coal storage an area suitable for stocking 800,000 tons of coal has been provided and the coal-handling plant has been designed for maximum operating convenience.

Owing to subsoil conditions, the building and plant foundations are extensively piled, some 3,600 prestressed concrete piles, each 20 in. in diameter, having been driven. The station itself is to be 600 ft long by 210 ft wide for four sets.

Installed Plant

The unit system has been carried out throughout, each set having its own steam generator, associated plant and chimney stack. Two-cylinder turbines have been selected, consisting of an h.p. cylinder exhausting to a double-flow low-pressure cylinder in tandem. Steam conditions at the stop valve are 850 lb sq.in. and 900° F. total temperature. These turbines are coupled to 100,000 kW alternators, hydrogen-cooled, generating at 13·8 kV. At full load, the estimated steam consumption will be in the neighbourhood of 850 klb/hr.

Pulverised fuel firing has been adopted for the boiler furnaces, and, owing to the existence of anti-smoke legislation in Toronto, special attention has been paid to the problem of ash and dust elimination. Both mechanical and electrostatic dust removal plant has therefore been installed.

Alternators

The alternators presented the manufacturers (C. A. Parsons and Co.) with some difficult problems. Owing to transport restrictions, they were constructed with separate casings and core frames. As mentioned before, they are hydrogen cooled, and the auxiliary equipment had to be designed. A further difficulty was that Toronto is in the throes of a frequency standardisation from 25 to 60 c/s. The first and third units have therefore been designed for initial working at 25 c/s and provision has been made for rapid conversion of these units for operation at 60 c/s when the frequency change has been completed . When operating at 25 c/s the machines will run at 1,500 r.p.m. with an output of about 80 MW, at 11 kV, and after rotor alteration which will take about three weeks, will run at 1,800 r.p.m., 60 c/s, with full output at 13,800 V. The remaining two units will operate at 60 c/s from the outset.

Some idea of the alternator size can be gathered from the fact that the rotors weigh 78 tons, the stator itself and windings 157 tons and the stator casing 65 tons.

The stator core assembly being lowered into position on site

Progress

The progress of this great project has been unusually rapid. In September, 1949, the first pile was driven on site; by the end of October, 1951, the first set was started up, and it is expected that all four units will have been completed by 1953 giving an output capacity of 400 MW. The two intermediate sets are scheduled to be in service by the end of November this year and November, 1952, respectively.

Estimated cost of the Richard L. Hearn station is $66,750,000, about $166 per kW or $124 per h.p., compared with $121 per h.p. for the 480,000 h.p. hydro-electric project at Des Joachims.

Our readers' views ...

Electricity and Safety

AS there's an urgent need for action now with regard to the use of electricity, may I point out a few things that can be done to lessen the risk of electric shock.

Firstly, a Midland town has 40% of its domestic installations unsafe by the pre-war style of wiring, through having the incoming tails both the same colour (i.e., two red v.i.r. leads). In consequence, the meter fixer never checked which lead fed its opposite on the house installations, causing the neutral line to be live, lampholders to be live when the switches were off, and fires live when the switch plug was switched off. May I therefore plead for the innocent, by asking the Board to check over these old type connections to its supply.

Secondly, *some* manufacturers of electrically-operated machines are sending machines on the market assembled by semi-skilled labour without the slightest knowledge of the hazards of electric shock due to 12 V leads and 415 V leads, encased in the same conduit, meeting the Demon Oil King. I should like to suggest that they check over their assembly lines and help the innocent operator.

Thirdly (and this is where I get an uproar from the manufacturers), scrap off the retail market all 2-pin plugs and sockets, as the present-day use of metal-clad domestic equipment calls for earthed sockets.

Children are fond of placing nails, screws, etc., in holes (open sockets) so shuttered type switch plugs should be the only type used for domestic purposes.

Also, why fit top entry outlet switch plugs? They often fill up with dirt and fluff only to be cleaned out by the inexperienced consumer with nails etc., to the detriment of the individual. Side entry and front entry shuttered sockets are the ideal thing, so why not use them.

Lastly, the Government have a road safety campaign—why not a home safety campaign, too? Leaflets could be issued to every consumer pointing out the dangers of: Frayed leads on irons; using 2-way lighting adaptors for fires and irons instead of what they are meant for; soaking walls when decorating with the water entering the top entry switch plugs. It should also advocate reporting any fault to competent electricians and not entertaining home-handymen.

A. K. Williams
A.M. Inst. B.E.

LEICESTER

Direct Earthing

THE article by Mr. Croft in your October 11 issue, and the letter by Mr. Gilbert on the above topic will, no doubt, be of interest to all installation engineers and contractors, and will help to explain some apparently curious and alarming happenings.

I have myself recently encountered two cases where a discharge of current occurred from a lead water pipe (to which the electrical system was earthed) to a gas pipe.

In one case a hole was melted in the gas pipe and a fire nearly started. As far as is known, there are no non-metallic water mains in this district, so the water system has always been considered a good earth.

I feel that it will be a long time, if ever, before we are able to have completely insulated installations, and even if earth leakage devices were 100% reliable, I don't feel that the consumer should be expected to stand the cost, particularly in small houses with a few lights and plugs.

I have for some years contended that the onus of providing a reliable earth is on the people who provide the electricity. If the position is now as dangerous as your contributors suggest, and from my own experience I agree that it is, then I think the Electricity Boards should provide a high conductivity earth for each consumer either from their cable sheath or, if necessary, from a separate earth core.

They already do this in some districts, and evidently realise the necessity for it.

H. R. Mann

LEAMINGTON SPA

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Surdity

METEOR in your issue of November 1, hits at some of the words used—notably "desorption." But is this—or for that matter the "de-bussing" he dislikes so much—worse than the "de-gassing" used by rectifier manufacturers? As for "sorption" as a variant of absorption and adsorption, I would not care to venture an opinion. Why not appoint a *hoc* committee to settle this struse problem?

Total Stainer

BOTS LANGLEY

PROGRESSIVE POLICY FOR RAILWAYS

A PROGRESSIVE policy for railways was the theme taken by MR. A. S. QUARTERMAINE, C.B.E., M.C., B.SC., for his presidential address delivered on Tuesday to the Institution of Civil Engineers. He declared that the idea in the minds of some, that the railways were in the process of being superseded by road and air transport, was wrong, and nationally unsound. If the traffic at present handled by the railways were gradually transferred to the roads, the effect would be disastrous and a crippling expenditure would be incurred in an attempt to match the roads to the traffic.

Greater Confidence

The existing railway system would cost about £3,000 million today, and whilst some trimming of its extent was necessary, the main structure needed strengthening and improving for the greatest good of the country. In particular the confidence of those associated with the running of the railways had to be strengthened by knowledge that the industry would advance. The unavoidable curtailment of capital investment in the railways could cripple them permanently if it were carried too far.

Maintenance of the way and works of British Railways involved an expenditure of over £50m/year and the effective reduction of this without loss of efficiency necessitated the employment of staff with engineering training and ability of a high order. Many young engineers recognised that railway work was a valuable training ground, and it was essential that the best of these were not attracted away from the service. Railway engineers were to be commended for the efforts they were making to contend with rising costs, but no amount of skill and training would be sufficient unless something of the spirit of Brunel was added.

Mr. Quartermaine's comparison with Brunel was a reference to the earlier part of his address, in which he had described the construction of the original Great Western Railway, characterising it as an example of the indomitable courage and tireless energy of Isambard Brunel, who was responsible for the work. A total of 118 miles was completed in under six years.

Old Faradians' Dinner

TRADITION was duly honoured at the annual dinner of the Faraday House Old Students' Association on Friday last, when SIR JOHN HACKING, M.I.E.E., as President of the Institution of Electrical Engineers, proposed the toast of "Faraday House." He spoke of Faraday House as playing an important part in the education of professional electrical engineers, and so of working in co-operation with the Institution, which set the standards to be attained. Amongst the concerns to which Faraday House sent engineers was the supply industry, and it could hardly have escaped notice that this industry had been passing through troublesome times, and that its shortcomings had been over-emphasised. He now hoped that with the first stage of nationalisation past, political pressure might be less acute, and especially that no violent changes would be made. There was no doubt that the wide basis of operations made possible by nationalisation had made possible many economies, but there was no surer way of frittering these away than by bringing uncertainty into the industry, and by causing a lot of time to be wasted in answering criticisms. There was at the present time an attack on the ability of engineers as administrators, but the experience of some private firms belied the charges made.

DR. W. A. C. COODE-ADAMS, M.A., M.I.E.E., F.R.I.C., Principal of Faraday House, replied to the toast, and reviewed some of the events during the past year. He noted that the recent Government White Paper on Higher Technological Education had emphasised the importance of practical training for engineers, a matter to which Faraday House traditionally attached great weight. Dr. Coode-Adams was followed by MR. A. W. BERRY, M.I.E.E., M.I.Mech.E., the immediate Past President of the O.S.A., who in proposing the toast of "The Guests" traced the history of Faraday House back to the Hammond Electrical Engineering College which was opened in 1882, and recalled that in its 70 years of existence Faraday House had seen only three principals.

L Branch

The task of replying for the guests fell to Vice-Admiral SIR MICHAEL DENNY, K.C.B., C.B.E., D.S.O., R.N., the Third Sea Lord, who spoke mainly of the recently formed L branch of the Navy, and of its importance. He said that he was delighted to be able to comment on the extremely high standard of this new branch of the service, and he emphasised that with modern ships electrics its existence was most necessary. Admiral Denny went on to say that the Admiralty was spending more money on research and development in electrical matters than on any other branch of engineering, and that this was reflected in the amount of rearmament work being put out. The electrical engineering strength of the Navy was hardly great enough to carry the load being placed on it. Sooner or later nearly every electrical firm in the country would be engaged on work for the Navy, and the smaller the number of concerns not so working, the better chance there was of achieving the purpose of all this effort, which was the maintenance of peace.

Applications of METAL RECTIFIERS*

By G. E. B. WHITE, A.M.I.E.E., D.I.C., M.A.E.T.

THE metal rectifier is such a universal piece of apparatus that it tends to be considered just as "a rectifier" and nothing more. It is not until an unfamiliar application arises or until one sees the (apparently) bewildering range of types and sizes listed by manufacturers that the average engineer realises that there is more to the matter than meets the eye. It is thought, therefore, that some notes on various aspects of rectifier application will be of interest.

Measurement

The rectifier plays a very large part in the design of modern measuring instruments. An important rectifier application is in enabling the inherent accuracy of the moving coil instrument to be applied to a.c. circuits.

For this purpose small mechanical housings have been designed, each holding four rectifier elements connected in a bridge circuit, to enable the housing to be mounted direct inside the instrument case. Fig. 1 shows a 10 mA instrument unit, typical of the present range of instrument units available from 0·25 mA to 10 mA, together with a larger size unit which is available for 50 mA up to 500 mA with a different mechanical construction, as a larger size of disc is used. These are used with the larger instruments and recording meters.

The advantages of using rectified moving coil meters for a.c. measurements are good damping, low power consumption, greater degree of accuracy, and a lineal scale as compared with moving iron meters. They are also suitable for high frequency work.

It must, however, be borne in mind that these instrument units are special, in rating and construction. The normal rating of rectifier units must not be employed owing to the relative value of reverse to forward current; in all cases it is advisable to consult with the manufacturers or refer to the literature available on this application. It is interesting to note that it is the copper oxide unit and *not* the selenium rectifier which is used. The reason for this is the better resistance characteristic of the copper oxide unit in the forward direction at the start of rectification, and the better

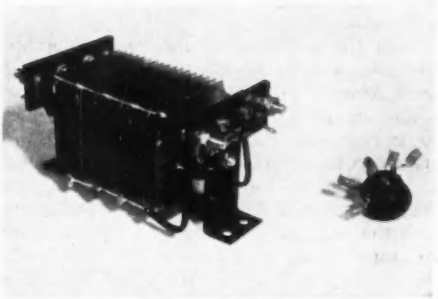


Fig. 1. Large and small instrument rectifiers

reverse current characteristic. The bottom bend voltage drop is 0·2 volts as opposed to 0·4 volts for the selenium rectifier, this giving a straight line characteristic down to a lower percentage of the full scale consumption.

Rectifiers are also used for supplying e.h.t. to the anodes of cathode-ray tubes. This can be done in several ways, all eliminating the use of the filament transformer winding required by valves, which has to be insulated from earth at the anode voltage. It is insulation troubles on this winding which frequently cause failures of the transformer. The first method is to use the centre-tapped transformer, usually 350-0-350 V, of the h.t. supply and a rectifier multiplier arrangement known as the Westeht circuit consisting of rectifiers and condensers. These can be obtained for all types of tubes, being in sizes from 1·7 kV up to over 5 kV.

The second method is by using the line flyback circuit pulse and multiplying this by two or three stages to the desired value of the e.h.t. required. Half-wave and voltage doubler circuits as discussed in a previous article are also used.

Rectifier units are used in photo-flash units for providing a source of d.c. to charge a condenser (usually 33 mFd). The circuit is a modified voltage doubler arrangement operating

* Sequel to "Developments in Metal Rectifiers," ELECTRICAL TIMES, May 31, 1951, and "Circuits for Metal Rectifiers," Aug. 9, 1951.

from 900 V a.c. and giving a d.c. output of 2,000 to 2,500 volts.

Magnet Coils

One of the principal applications is to provide a d.c. supply for magnetic chucks, magnetic separators, mechanical separators such as vibrating screens, electro-magnets used for lifting and handling of magnetic materials and for the operation of brake gear and contactor coils.

With the exception of the application for vibrating screens in all the fore-mentioned applications a full-wave single or three-phase bridge circuit is used depending on the d.c. power required. For economical operation the magnet coils should be wound for the natural d.c. voltage resulting from the a.c. supply, thus eliminating the use of a mains transformer with the rectifier equipment, or alternatively, an auto-wound transformer may be used. Where only a few d.c. watts are needed a current doubler circuit is used. In all these cases, however, it is essential for the installation to have closely rated fuses on both sides to ensure protection against earth faults.

The mechanical separators depend for their action on a vibrating screen, the traverse or vertical motion being obtained by alternatively energising and de-energising the operating solenoid electro-magnetically. For this purpose a half-wave metal rectifier is used to energise the operating solenoid on alternate half-cycles of the a.c. supply frequency.

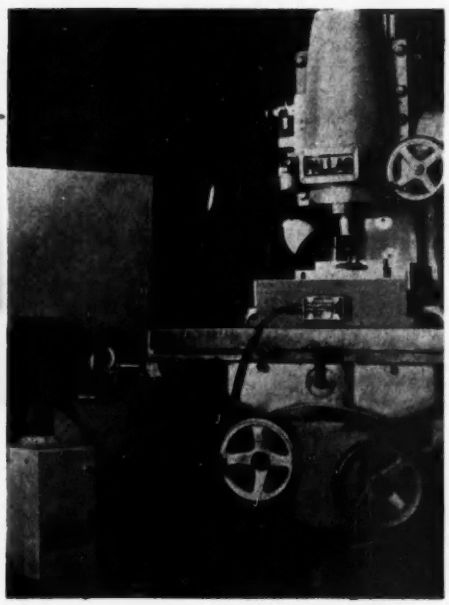


Fig. 2. Rectifier-operated magnetic chuck

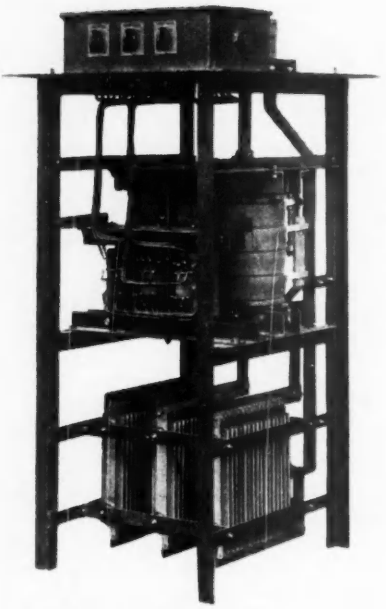


Fig. 3. Heavy-current plating unit out of tank

A point to be borne in mind in all cases is the difference between the hot and cold resistance of the electro-magnet. In many cases where the magnets are frequently switched on and off the maximum operating resistance is not reached and the d.c. output should be adjusted to the cold conditions, while if the magnet is energised for long periods the d.c. output should be adjusted to the hot conditions.

Electro-Deposition

Another interesting application is for the electro-deposition of protective coatings. For this work a low voltage d.c. supply is required which shall be easily controlled, highly efficient, require a minimum of maintenance and no renewals. The current required depends on the size of the plating installation and may vary from tens of thousands of amps down to a few hundred amps. A half-wave three-phase rectifier is ideal for this work and is usually oil immersed to protect it from the corrosive fumes of the plating shop.

The associated mains transformer and regulator are also oil immersed and assembled in

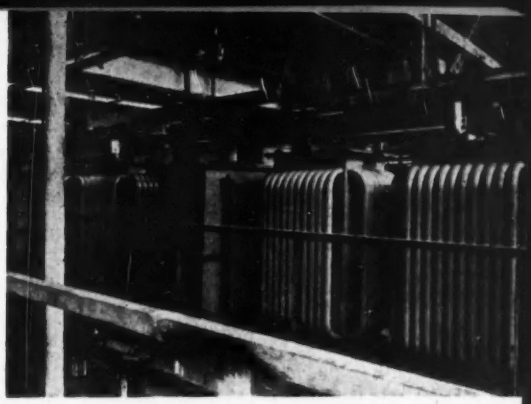


Fig. 4. An installation at the Westinghouse works totalling 8,000 amp at 7 V

the same tank as the rectifier elements or in separate tanks according to the value of the d.c. output. For this class of work plates as large as 12 in. × 3 in. are used.

Fig. 4 shows a typical installation at the works of the Westinghouse Brake & Signal Co., Ltd., this being a 7 V 8,000 amp equipment. This type of equipment is used for all electrolytic processes including zinc plating, copper plating, silver plating, nickel plating, chromium plating, electro-polishing of stainless steel, anodising, and the electrolytic production of hydrogen and chlorine

D.C. Motors

The metal rectifier is often used for d.c. motors ranging from fractional horse-power machines to medium horse-power machines. It is advisable to have some means of adjusting the d.c. output voltage when a single-phase supply is used owing to the difficulty of predicting the voltage ratio due to the effect of the motor load. This may be possible by means of a resistance which is already in the motor circuit; but a better arrangement is to supply transformer tappings. The range of control required is small, adjustment over, say, 20% of the d.c. voltage being adequate. If the d.c. voltage is close to that of the main supply, an auto-transformer may be used for this adjustment purpose with a consequent saving in cost. When auto-transformers are used, as there is no electrical isolation between the a.c. mains and the d.c. output, it is essential that close rated fuse protection is employed on both sides. A double-wound transformer must, of course, be used when the ratio of a.c. to d.c. voltage is high.

Another application is the testing of d.c. machines used on automobile and aero engines, such as starters and dynamos. For this purpose a low voltage variable d.c. supply is required to test resistance figures of the armatures and field and, what is more important, to test the performance of the starter motors under load conditions.

The installations are usually designed for testing both 6 V and 12 V machines having a centre-tap output and being mechanically similar to the oil-immersed sets previously described.

Battery Charging

Battery charging, one of the rectifier's largest applications, can be carried out in three ways, i.e. constant current, constant voltage, and taper charging.

Constant Current Charging is the most practical circuit to employ when dealing with a fixed number of cells to be charged at a constant current, a varying number of cells and batteries with different a.h. capacities. A single-phase circuit is normally used as shown in Fig. 5, and the a.c. input to the rectifier is made adjustable (by means of tapping switches on the mains transformer) while a small resistance in the a.c. acts as "ballast." The variable a.c voltage is to enable the d.c. output of the rectifier to keep in step with the rising battery voltage during charge and so maintain a constant d.c. charging current. It is also useful for adjusting the d.c. output to suit a varying number of cells or altering the charging rate according to the requirements of the capacity of the batteries on charge. The purpose of this "ballast" resistance is to stabilise the charging current owing to the low impedance of the battery and to prevent fluctuations of the current due to mains variations.

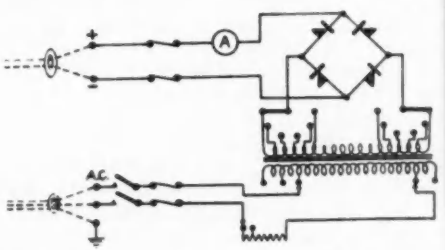


Fig. 5. Typical diagram of circuit for constant-current charging

When the d.c. power for charging purposes exceeds a certain value, usually about 0·75 kW, the resistance is replaced by choke "ballast." The latter produces the same effect without resulting in a large in-phase power loss and so increases the overall efficiency. In many cases this reactive ballast is obtained by suitable

transformer designs. Although "ballast" may not be included in all makes of chargers it nevertheless remains a criterion of good design.

This circuit is employed for full rate or trickle rate charging and if desired the two charging rates can be included in the one charger.

This circuit is used when the charge-discharge principle of battery operation is employed and normally a two-rate charging system is adopted to give a full trickle charging rate to the idle battery. The scheme of operation is installed in electric power stations, and telephone exchanges.

It is also used for charging batteries when they are not called upon to supply their normal load such as car batteries, batteries in railway signalling installations, emergency alarm bells and numerous other cases.

Constant Voltage Charging. With this method of charging the value of the d.c. current depends on the actual a.h. capacity that is available in the battery. As the a.h. capacity of the battery is reduced, or the battery in other words is discharged, a point is reached when the voltage of the battery falls below the standing or floating voltage figure. For lead acid batteries this is about 2·15 volts per cell to 2·35 volts per cell, and for the alkaline battery about 1·45 volts per cell to 1·6 volts per cell depending on the strength of the electrolyte and the standing losses. These are known as the floating voltages and hence the name "floating battery system."

Normally the batteries are "floated" across the d.c. supply which provides the energy for the load, the battery acting as an emergency supply and will provide a means of smoothing the rectifier d.c. output ripple should this be essential.

As the voltage of the battery changes from the predetermined fixed voltage of the d.c. supply, current will either flow into the battery from this source to raise the battery voltage to the floating value, or else current will flow from the battery into the load to lower the battery voltage to the floating value.

The method of keeping the d.c. voltage constant is by adjustment of the a.c. input voltage. This can be arranged with hand-operated, mechanically operated, or electro-magnetic control. In the second type of control the a.c. voltage is operated by an electro-motor, the latter being controlled by a relay connected across the rectified d.c. voltage. The third type of control often called the "Westat" system, in which a split-phase system is employed. Two transformers have their primaries connected in series and their secondaries in Scott connection. The primary of one transformer is shunted by a condenser, resulting in a two-phase input to the combined transformers and a metal rectifier is connected to the three-phase output. Briefly, the transformer-condenser combination is designed to produce a three-phase supply at full load and a single-phase supply at no-load. Variations in load current or supply voltage result in phase swinging which controls the d.c. voltage to within close limits. The voltage output will not vary by more than $\pm$ 4% for changes in load from open circuit to full load with simultaneous mains variations of plus and minus 6%. At constant load this variation can be made less than $\pm$ 1% for mains variations of up to $\pm$ 10%.

Another system is employed, in which the voltage is maintained constant at about 2·5 volt/cell and the batteries are all connected in parallel. This gives a charging rate varying over a wide range depending on the state of the battery and it is not recommended as an efficient method of charging.

Taper Charging. With this type of charging the "ballast" mentioned under constant current charging is increased in value with the result that the d.c. current "tapers" as the battery voltage rises. The usual limits used are normal charge at 2·0 volts/cell tapering to half-normal charge at 2·65 volts/cell as the battery voltage rises. This method of charging is used when a fixed voltage battery of a predetermined a.h. capacity has to be charged, the operation of the circuit being automatic. When automatic charge termination is required an MJV relay is fitted, which by a voltage and time device will switch off the set when the battery is fully charged.

In view of the recent demand for more mechanical handling to increase production efficiency, one must refer to the important part the electric battery propelled truck and vehicle plays in the handling of component parts in industrial concerns and the distribution of consumer goods over limited areas. To maintain the battery the charging circuit just described is employed. The most efficient system to adopt is to have one charger per electric vehicle each being fitted with a plug and socket to obtain a simple and quick connection.

Engine Starting—Testing

Everyone has had the unpleasant experience of pressing a car starter button and getting that slow, irritating grinding noise, which one knows will never start the engine, merely discharging the battery. It is possible for this annoying trouble to be eliminated by the

simple remedy of keeping the car battery charged, by using a garage charger.

For public and commercial transport it is essential for quick and easy starting at the garage to be obtained under all conditions and without discharging the battery. This can be achieved by using a three-phase bridge connected transformer and rectifier which is short time rated and assembled in a portable framework. The rectifier is wheeled to the vehicle concerned and by means of a trailing cable the necessary power to start the motor is obtained from the a.c. supply and not the battery. A rectifier of this type with a d.c. output of 24 V 200 amp/12 V 400 amp has started engines up to 150 h.p.

Fig. 6. A Westinghouse portable engine starter for heavy duty (covers removed)

The same principle is also used for starting aero-engines. In many instances the set previously described is used. For the larger engines such as the Goblins and Ghosts, a larger starter has been developed, having an output up to 1,000 amps at 24 volts, but which will develop up to 2,000 amps at about 12 volts corresponding to the initial starting and, as the automatic starting panel operates the starting torque lessens until the engine is fired when the d.c. output at 24 volts is approximately 1,000 amps.

Both in the case of automobile and aero-engines this provision for additional starting facilities is more important in the colder weather when bearings are likely to be stiffer.

Test Beds

Another interesting application is in engine test shops where the engines are mounted on the individual beds and tested for starting inertia and friction of bearings.

In one such installation a metal rectifier

Fig. 7. An electric vehicle charging installation

equipment has been installed for several years to replace a battery and motor generator set. It caters for 6 and 12 volt engines, the d.c. being a three-wire supply. A conveyor belt brings the engines to the test rigs—there being four rigs for four different types of engines. The engine is first motored to provide a power load for the last engine under test. This latter engine is then removed and a new engine fitted back to back with reverse coupling. While this is being done the engine previously motored is wired up for ignition, started up, and then drives the new engine.

Motor Cycle Lighting

Until recently the battery on a motor cycle has been charged by means of a dynamo and associated cut-out. This scheme, however has certain inherent disadvantages, including commutation troubles, moving parts and relay contacts, and initial cost and maintenance.

An alternative arrangement is to use an alternator together with a rectifier which eliminates all the above troubles. There are now no commutators, brushes, or slip-rings, as a flywheel alternator is used with fixed coils. The cut-out is not needed as the rectifier has an infinite reverse resistance and will prevent the discharge of the battery through the alternator. The whole arrangement is very cheap to produce, has the utmost reliability and no maintenance is required.

In good alternator design a compromise has to be made between having a useful voltage at low speeds and an excessive value at high speeds; the voltage being maintained within close limits over a wide speed range.

The rectifier unit used has an output of 6 V 5 amp under optimum conditions; it is a centre-tapped bridge unit and is assembled in a specially designed waterproof housing consisting of two aluminium covers which are riveted together using a rubber seal, enabling the complete unit to be forced cooled. These covers act as the d.c. terminal and the two

a.c. leads are brought out through the rubber seal.

As the unit must be force cooled, it must be mounted in a reasonable position on the motor-cycle but should be adequately protected from external mechanical damage.

The next detail to consider is the electrical circuit arrangements which can be grouped under the two systems of spark ignition, viz.

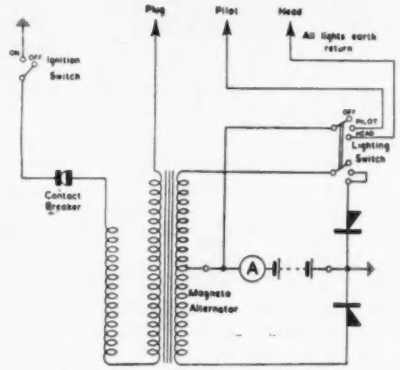


Fig. 8. Diagram of charging-magneto ignition system for motor cycles

magneto and coil. Fig. 8 shows a circuit using magneto ignition. Here the full charging rate is only given when the lights are on. With no lights, one arm of the rectifier arrangement is open circuited and thus results in a reduced charging rate as only a half-wave circuit is used.

A circuit using coil ignition is shown in Fig. 9 where a full-wave circuit is used all the time, the rate of charging being reduced by a swamp resistance inserted when the lights are "off." This arrangement is preferential to half-wave charging. The disadvantage of coil ignition, which is the inability to start if the battery is run down, is avoided by having an emergency start switch which puts over to magneto running.

Electrical Supplies in Aircraft

This subject has been comprehensively dealt with in recent years. In modern planes power demand has risen from a few hundred watts to over 150 kVA in the Brabazon.

The tendency in modern design is therefore to use an alternator, usually three-phase, with forced air-cooled metal rectifiers for the d.c. supply. The voltage of the d.c. supply varies, some machines having 24 volts, other 108 volt supplies, and in some cases there is a battery floating across the supply as in the case of the Hermes IV and V.

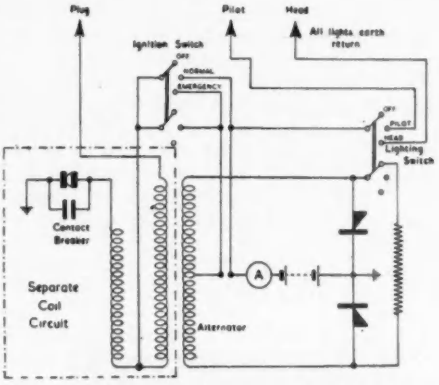


Fig. 9. Motor-cycle charging-coil ignition system

It is not within the scope of this article to examine the merits of the various systems, but simply to stress that the metal rectifier is being used in ever-increasing numbers for aeroplanes. Interesting points in the design of the rectifiers are the light-weight construction, and the reduction in bulk. The plates themselves are made of thinner steel strip than normal, this being better than aluminium as it is more rigid for a given weight and volume. The spacers are aluminium die-casting which are thinner than normal, this being possible due to forced draught cooling, while the connectors are also of special light-weight construction.

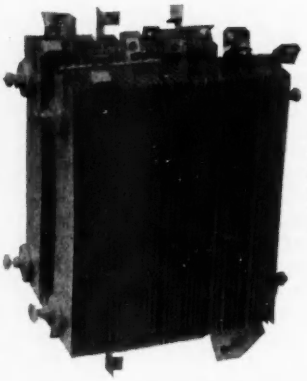


Fig. 10. Plate bank of light-weight aircraft metal rectifier

This unit illustrated in Fig. 10 is designed to give an output of up to 34 V 225 amp d.c. in a three-phase bridge circuit when adequately forced cooled. To obtain this cooling the rectifier is mounted in the air intake stream of

the jet engine and so arranged that d.c. power can be obtained either on the ground or in the air. In the case of jet turbine machines the plate bank assembly is not placed in the main air intake stream but in an auxiliary air tube which is let into the side of the main tube and is cooled rather by suction than direct pressure. Owing to the high air pressure and wind speed obtained the 3-in edge is presented to the wind tunnel and rubber pads are placed along the 12-in side of the plate assembly to provide air and electrical insulation. Where several plate banks are needed these are usually placed one behind the other in the wind tunnel. There are many other requirements on the plane where special voltage may be needed, such as for instrument use, and in these cases a.c. is usually taken to the component and a local transformer and rectifier unit used.

Arc Lamps

When these equipments are operated from d.c. mains a ballast resistance is employed to reduce the supply to the operating voltage required, normally about 50 volts. It is possible to operate this equipment from a.c. mains using a metal rectifier with the addition of a smoothing choke in the d.c. output side,

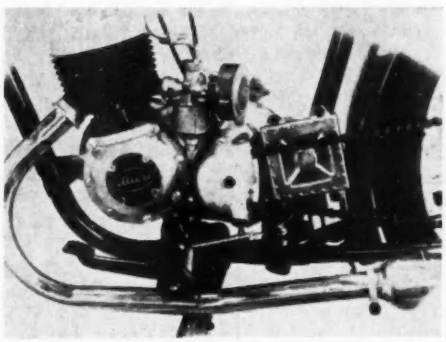


Fig. 11. *Motor-cycle rectifier unit in position*

to reduce the percentage ripple voltage content of the rectified power supply. Normally these are operated from 200/250 V d.c. equipments, but if it is possible to make suitable adjustments in the resistance they can be operated from 100/120 V d.c. outputs with an obvious reduction in operating costs.

A special application is the cinema arc projector lamp, which having a special operation time sequence and requiring a high circuit overall efficiency employs a special patented circuit. This utilises an electro-magneto

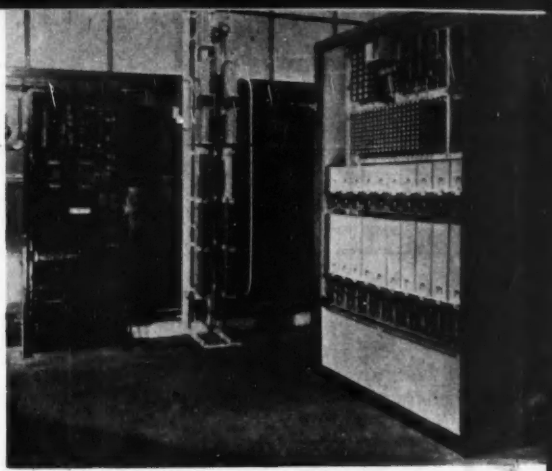


Fig. 12. Metal rectifier operating telephone system

principle, which is therefore entirely static, to obtain an adequate degree of reactive ballast and achieves a high arc performance at maximum efficiency.

Radio and Electronic Applications

This is one of the applications where all four types of rectifier are used and demonstrates the variety of electrical requirements showing in present day telecommunication, from the high-frequency circuits where the copper-oxide types are employed, through the l.t. and h.t. power circuits where single and double voltage rectifiers are used, to the e.h.t. circuits where the quadruple voltage are units used.

It must be emphasised here, that for low current requirements at low and medium voltages the choice between single and double voltage units depends on the actual value of the d.c. current and voltage together with the circuit employed. It is only at the higher voltages and currents where the supremacy of the double voltage rectifier is clearly defined. It is essential to study the relative merits before making a choice. There are also certain restrictions in the supply of double and quadruple voltage units.

Before concluding, it will be of assistance to clarify the frequent references made to low, medium, high or heavy and extra high voltage and current. The writer is unaware of any rigid B.S.S. ruling on the precise limits of such gradings but it may be helpful if the following figures are taken for a rough guide only.

SUGGESTED CLASSIFICATION OF RECTIFIER DUTY

Grade	Voltage	Grade	Current
Low	up to 18	Low	up to 1 ampere
Medium	" " 250	Medium	" " 100 "
High	" " 1,000	Heavy	over 100 "
Extra High	over 1,000		

Problems and Practice IN ENGINEERING

Identifying a Dead Cable

IT has always been a matter of difficulty to identify with certainty a dead cable where there are other cables running alongside it. Acoustic methods, involving listening to mains hum or interrupted currents are very unreliable.

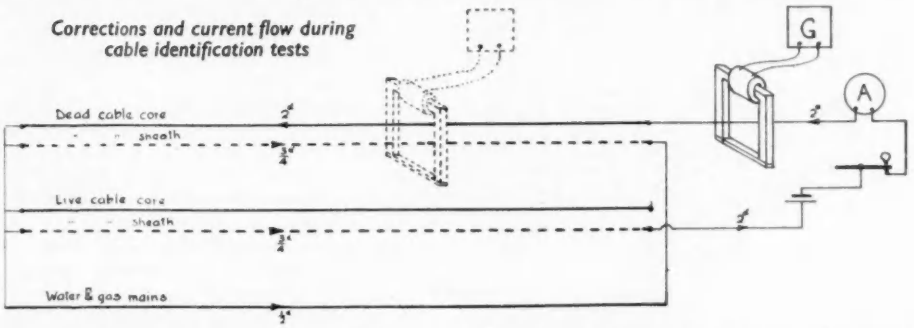
The following method has been employed with success. The necessary apparatus is simple and comprises a galvanometer, a 6 volt battery, key ammeter 0–5 amps, and a clip-on transformer.

The clip-on transformer itself consists of a laminated Stalloy core and a removable armature, the core forming three sides of a rectangle and the armature the fourth. On the core, opposite to the armature is wound a coil of some 200 turns of 30 to 36 s.w.g. copper wire, the ends being brought out to terminals to take the galvo leads. The internal dimensions of the core are made large enough to allow the core to straddle the largest cable likely to be met with.

If the transformer is slipped over a lead-sheathed steel armoured cable, the armature put in position and a direct current of, say, 2 amps sent through any core a kick is obtained on the needle. In the diagram, full lines represent the cores of two cables laid side by side, and the dotted lines represent their lead sheaths and armouring which are bonded together and earthed at both ends. One cable is alive and the other is dead.

The circuit is prepared as shown. The far end of any core of the dead cable is connected to earth. The clip-on transformer is put over the wire leading to the core at the sending end and the key depressed. A kick is obtained on the galvo and the direction is noted. In addition, the side of the transformer which faced in the direction of the cable route is marked with chalk. The transformer and galvo are then taken to the site where the cables are exposed and the former is put over one of the cables, the chalked side being made to face in the same direction as before. It has been arranged that an assistant depresses the key momentarily, say once a second at the sending end. It is important that the keying is done in this manner as it enables the one using the clip-on transformer to distinguish between the closing and opening of the circuit. The closing operation will be followed immediately by the opening operation and after a second's interval the next closing operation occurs. If a deflection in the same (forward) direction is obtained it can be assumed that the transformer is on the dead cable. The deflection obtained with the transformer on any other cable (the number of cables is immaterial) will be in a "backward" direction since their sheaths and water mains, etc., act as parallel return paths.

Corrections and current flow during cable identification tests



Assumed representative figures of current are shown in the diagram. The return current in the sheath of the dead cable will always be less than that in its core and therefore can never neutralise the magnetic field of the core current. Therefore, the dead cable is the only one which can give a forward deflection on the galvo, all the others giving a backward deflection.

J.S.F.

Contributions to this page dealing with specific items of interest to electrical engineers and maintenance men are welcome, and, if accepted, will be paid for at our standard rates. Contributions should be written on one side of the paper only and may be accompanied by sketches, which will be re-drawn for publication.

MUSINGS OF A MOTOR

Overheard by John Turland and Illustrated by L.A.G.

EIGHT o'clock again, and my man ready to press the button. Here we go ! My word, the machine is stiff this morning. Why doesn't the electrician adjust the starter so that there's less delay in the star position? He knows I can hardly start this lot, let alone accelerate to a decent speed, until I'm in delta. I'm just crawling round getting hot for nothing. Why they ever put a star/delta starter on a motor my size, goodness knows. There go the contactors, at last! That's better, now I can get away.

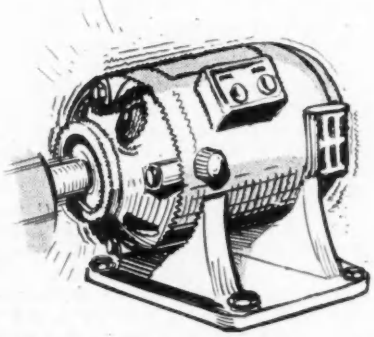
I don't feel too good this morning. When they took me off the countershaft and put me on this direct drive job they weren't too careful about lining up—and as for end thrust, I don't believe they have ever heard of it. Can't they hear my bearings grumbling?

But, I suppose it could be worse. Take poor old General Purpose, who used to sit on those slide rails, over there. He was a perfectly good standard job, but they put him on a drive with frequent reversal—pulled him up with a jerk and bumped him off the other way, several times a minute, all day long. Before a week was out he lost his fan and a bit went through his stator windings. Quite a flare-up there was, and now they've got to wait weeks for a motor designed for the drive. Serves them right, I say, but no consolation to old G.P., who is likely to spend most of the summer in a rewind shop if they haven't got his size wire in stock.

I suppose Oily Joe will come along today with his grease gun and give me a couple of squirts. The pounds of grease I've had to churn up and throw out all over the place ! I'm in a shocking state. Doesn't anybody ever read the maintenance instructions? How can a motor keep himself clean and his air-ducts open when he's smothered in fat? I knew it—here he is. If he had a holiday for six months it would suit me fine.

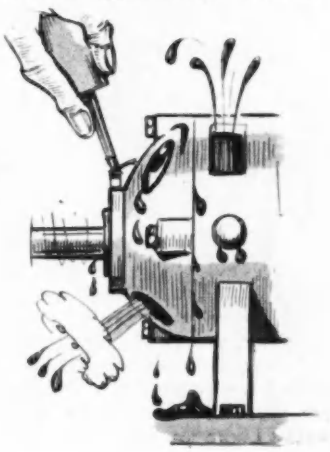
. . . old General Purpose likely to spend most of the summer in a rewind shop. . . .

Volts are getting low again. I suppose they know I've never had rated voltage across my terminals, even before power cuts? But, of course, they don't. They wire me up with the bare minimum size cable, that goes half way round the works to the dis. board, and never think to check the voltage on load, let alone the



. . . not too careful about lining up. . . . Can't they hear my bearings grumbling?

. . . the pounds of grease I've had to churn up. .



current. It's as much as I can do to keep going, some days; and if they don't clean out my end-shield openings soon, where the grease has collected all the fluff and rubbish, I shall have a burn-out. I know I'm suffering from hardening of the insulation as it is.

Of course, some motors are lucky. I do pretty well full load all day, but young Vertical Flange, next door, hardly knows what it is to get warm. Somebody thought three horse-

. . . Young Vertical Flange just loafing along. . . .

power would do the job, ordered a five for luck, and then installed a seven and a half because one happened to be in stock. Just loafing along, wasting money. It's a wonder the wattless current doesn't choke him!

Now what's happening? Good gracious, they're trying a new sort of tool to give a bigger cut! It's more than I can do. If I don't start smoking soon then my name's Class B.

That's better. They are holding an inquest on the job. I suppose the finish is too coarse. If they spent a little less time sniffing over the job and spared a sniff or two for me, they might save an awkward breakdown.

Well, would you believe it? Some fathead has dropped a sack right over my air intake!

. . . nearly caught my death of water on the windings. . . .

I'll choke, you see if I don't. The things they do! Why, last week somebody hosed the floor, while I was running, too, and I nearly caught my death of water on the windings. Why wasn't I born totally enclosed fan cooled?

Any sign of the tea trolley, yet? I rely on a few minutes' light running, while my man has a cupper, to cool off a bit.

There goes the bell. That's better. I suppose I can last a little longer, if only somebody cleans me up a bit. I'm a bit worried about my driving-end bearing, though, and I should be happier if the electrician would check my current for me, but he trusts to an occasional quick feel with his horny hand.

Well, that's the end of the tea break. Back to the treadmill. (Ha! ha! Not bad for a squirrel cage motor, don't you think?) But I'll surprise them one day, by B.S.S., I will.

Meet you on the scrap heap!

BRITISH STANDARDS

Unified Precision Hexagon Bolts, Screws, Nuts (U.N.C. and U.N.F Threads) and Plain Washers—Normal Series, and Unified Black Hexagon Bolts, Screws and Nuts and Plain Washers—Heavy Series. *B.S.* 1768, 1951 *and B.S.* 1769, 1951, *price* 3*s. and* 2*s. 6d. respectively.* The publication of these two standards for unified hexagon bolts, screws and nuts marks the most important development to date in the work of standardisation between the three North Atlantic Treaty countries since the signing of the 1948 "Declaration of Accord." It will now make possible really effective implementation of the agreement to adopt the unified screw thread, the standard for which was published as B.S. 1580 in 1949. At an important conference between industrial and Service delegates from the United Kingdom, Canada and the United States, held at the end of April under the aegis of the British Standards Institution, agreement was reached in principle on the basic dimensions of hexagon bolts, screws and nuts, and overall limits were established for two series, normal and heavy series, based on American standards.

B.S. 1768 relates to the normal series of unified precision hexagon bolts, screws and nuts having unified screw threads in a range of nominal sizes from $\frac{1}{4}$ in. to 1 in. inclusive. B.S. 1769, in turn, deals with the heavy series of unified hexagon bolts, screws and nuts in a range of nominal sizes from $\frac{1}{2}$ in. to 2 in. inclusive. The hexagon sizes in this series are larger in proportion to the nominal diameter of thread than those in the normal series and it is hoped that this standard may go far to meet the needs of those who have felt the lack of the large Whitworth hexagon.

Engine-driven D.C. Generators for Aircraft. *B.S. G*134, 1951, *price* 2*s.* This British Standard applies to generators of continuous rating up to 50 kW for aircraft d.c. power supply and suitable for engine drive. The generators covered by the standard are of the pipe-ventilated type, taking air, for example, from the aircraft slipstream, and they are suitable for use either (a) up to such altitude as is declared by the manufacturer or (b) up to 20,000 ft.

High-Pressure Steam Plant

Trends in the Design of Steam Generators in the U.S.

By VERNON WALKER, A.M.I.E.E.

THE expansion of power generation continues in the United States at an unprecedented level in order to meet the continuing growth in power demands. Some idea of this rate may be obtained from the fact that if construction is allowed to proceed as planned, the utility companies will have over 75 million kW of generating capacity by the end of 1953—more than twice the figure installed at the beginning of 1941.

Under this projected expansion, the reserve margin of generating capacity is expected to show successive increases, reaching 14½% at the year peak in 1951, 18% in 1952, and 20% in 1953.

Main Design Trends

The scope of this expansion programme, together with the continued shortage of materials and the possibility of interference with manufacturers' schedules due to the defence programme, has caused considerable uncertainty as to the final costs of completed projects, especially those with long construction schedules. This uncertainty of future cost and also the availability of various types of fuel, have had an important influence on the trends of design of steam generating equipment, which include the following:—

(*a*) The wide application of the principle of single boiler-single turbine, even in sizes as high as 150,000 kW, to save both first cost and operating expenses.

(*b*) The application of duplicate units of recent design wherever possible to save time and capital costs.

(*c*) The continued use of semi-outdoor and outdoor boiler installations.

(*d*) The use of steam temperatures up to 1,050° F. (Based on satisfactory experience with this temperature, plans are being made for employment of 1,100° F.)

(*e*) An increasing use of the reheat cycle. Some 82 turbine units, representing 9·69 million kW, have been placed on order in the past 15 months. The reheat pressure ranges from 25-28% of the initial pressure, and in an increasing number of cases reheat is brought up to the initial temperature except where the latter is 1,050° F, when it is usual to specify reheat temperatures of 1,000° F.

(*f*) The provision of sufficient flexibility in the design of the coal pulverising equipment and the furnace, so that any available fuel can be utilised effectively. In some cases the equipment is designed for either coal or oil or gas, or all three.

(*g*) The design of boilers to operate without induced draught fans to reduce operating cost.

(*h*) The use of cyclone furnace boilers, which provide for considerable saving in building costs, and simplification of ash-removal equipment.

Detailed Gains

The largest gains in thermal efficiency using the conventional steam cycle lie in the direction of higher steam temperatures at pressures in

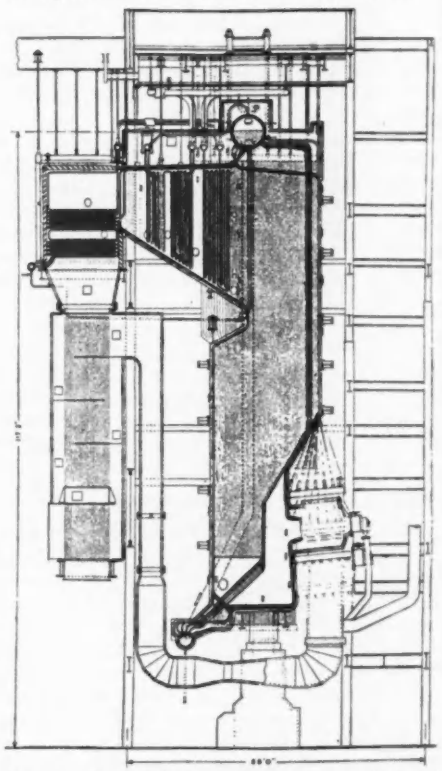


Figure 1. Cyclone furnace steam generator designed for 750 klb/hr. at 1,325 lb/sq. in., 935°F.

the range of 1,800-2,400 lb per sq in., and there is a tendency to design for steam temperatures as high as available materials will permit, and in many cases with high reheat steam temperature, in order to reduce operating cost by improved cycle efficiency.

The operation of boilers without induced draught fans, thus forcing the products of combustion through the setting under pressure, has proved beneficial in the following respects:

(*a*) The boiler efficiency is increased ¼ to ½% by eliminating air infiltration and its resulting stack loss.

(*b*) The fan power is 25-30% less, because the forced draught fan handles less overall weight at a relatively low temperature against less overall draught loss than with the conventional forced and induced draught fans.

(*c*) Induced draught fan maintenance costs and outage are eliminated.

To operate the unit successfully without induced draught fans it is necessary to prevent any leakage into the boiler room. The design of the furnace and convection surface must therefore be liberal, and the soot blower system must be adequate to obviate the likelihood of hand lancing. The ash-removal system must also be designed to operate satisfactorily under pressure.

The pressure-tight casing as developed is attached directly to the wall tubes, so that the temperature of the casing will be about the same as the temperature of the wall tubes. This prevents any possibility of dew-point corrosion from sulphur-bearing gases, or overheated casing due to gas by-passing. To provide for flexibility during starting up and shutting down, flanged joints are provided to take care of temperature differentials as high as 150° F. Any necessary inspection doors are provided with compressed air jets automatically blowing into the door opening to prevent gases from being emitted into the operator's face due to the internal pressure.

Cyclone Furnace Operation

The successful operation of the Cyclone Furnace at the Calumet Station of the Commonwealth Edison Co., in Chicago, over a period of years, has provided beneficial results mainly in the following ways:—

(*a*) Most of the ash in the coal is collected in the slag tank as slag, while only a small amount passes on through the setting into the stack. The discharge of relatively clean gases of combustion from the Cyclone furnace to the boiler unit presents a more economical arrangement of heat-absorbing surfaces and simplified dust-collecting equipment. Because of the substantial reduction in the size of the steam-generating unit required with this method of combustion there is also a substantial reduction in building volume.

(*b*) Crushed coal instead of pulverised coal is used in the Cyclone furnace, and this results in a lower cost of fuel preparation and less maintenance on the crushers than would be the case with coal pulverisers.

Fig. 1 shows a Cyclone furnace application for the Fish Street Station of the Commonwealth Edison Co., designed for 750,000 lb/hr at 1,325 lb sq in., 935° F. The steam temperature is maintained over a range of 562-750 klb/hr by means of stray attemperators.

Recent Improvements

The design of recent units represents an integration of refinements that have been proved in service under various conditions. These include conservative furnace heat releases, low gas velocities to avoid slagging with low-grade fuel, control of furnace exit gas temperatures by vertically adjustable tangential burners to maintain control of steam temperature and to compensate for fuels of different ash fusion temperature, and development of push-button control to full automatic operation of such burners.

With single steam generators designed to serve 150 MW machines, there are indications of the desirability of employing a furnace division wall in order to provide the required heat-absorbing surface without making the furnace dimensions unduly large. Also, if steam temperatures continue to increase, it may be necessary to incorporate radiant superheaters.

Remote centralised control for both steam generators and turbine generators is gaining favour, and in this connection the use of television is now an accomplished fact. Such an installation provides the operators in a centralised control room the necessary information about conditions in the furnace at all times, both when lighting up and when steaming. Television is also used to replace mirrors in reading drum water gauges.

An outstanding feature of 1950 was the placing on order of nine forced circulation units ranging in size from 795,000-1,000,000 lb/hr, with operating pressures up to 2,000 lb per sq in., and steam temperatures from 1,000-1,100° F. All these units will be used with the reheat cycle. Single boiler-single turbine plants are reported to give high availability. Nine such plants gave an average of 91·18%, with the highest 97·16%, covering a period ranging from one to 17 years.

Troubles—and Remedies

A series* of trouble-shooting tables specially compiled to assist maintenance engineers in rapid fault diagnosis

By S. SPENCE, B.Sc.

No. 9. MOTOR STARTERS AND SWITCHGEAR

THE starting equipment of a motor is just as important as the machine itself, and when it is appreciated that the primary causes of motor breakdowns are in very many cases traced to the starting switchgear, the need for systematic and efficient maintenance of these components becomes apparent. There are, unfortunately, still too many cases where a repetition of a breakdown of a motor occurs due to the primary cause not having been removed. For instance, a comparatively trivial defective contact in a starter or switch has been known to result in repeated burn-outs of the connected motor windings due to single phasing before the simple remedy of renewing the defective contact has finally been effected. This incidentally stresses the importance of establishing, wherever possible, the exact primary cause of a breakdown so that immediate remedial steps can be taken, thereby removing the fear of a repetition of that particular trouble.

*Previous tables have appeared as follows: Induction Motors, June 15, 1950; Transformers, July 27, 1950; D.C. Motors, Nov. 9, 1950; Synchronous Motors, Jan. 4, 1951; Single-phase FHP Motors, March 1, 1951; A.C. Generators, May 17, 1951; Mercury Arc Rectifiers, July 26, 1951; Rotary Convertors, Oct. 4, 1951.

AIR-BREAK SWITCHES AND SWITCHFUSES

SYMPTOM	CAUSE	REMEDY
General overheating.	Sustained current loading in excess of the normal current rating of switch or switch fuse due to:— (*a*) Overloading of circuit. (*b*) Inadequate current rating of switch or switch fuse for the circuit it controls.	(*a*) Reduce the circuit load to normal by locating and remedying the cause of the overloading. (*b*) Replace by larger and suitably rated unit. The circuit cable size should also be checked, as it may be necessary to install larger cables.
	Defective switch or fuse contacts with resultant transferrence of heat to the switch components and case.	Overhaul or renew the defective contacts.
	Inadequate current rating of fuse elements with consequent rapid deterioration and overheating.	Replace by suitably rated fuse elements, i.e. having the same normal current rating as that of the circuit controlled by the switch fuse. (See Note 1.)
	Loose terminal or fuse connection.	Secure connection after cleaning and overhauling the contact surfaces and renewing any damaged terminal nuts, etc.
	Fuses overheating under normal current rating conditions.	There have been instances of fuses being incapable of carrying their rated normal current continuously without exceeding the maximum temperature rise (55° C.) permitted under B.S. 88. If this is suspected it may be necessary to drill the case of the switch fuse, etc., to permit measurement by thermometer of the working temperature of the fuse contact. In the event of an excessive temperature rise being established, a suitable replacement fuse should be fitted.

AIR-BREAK CIRCUIT-BREAKERS

SYMPTOM	CAUSE	REMEDY
Overheating of contacts.	Overloading.	Reduce load or fit larger circuit-breaker.
	Defective contact.	Overhaul, adjust or renew contacts. The circuit-breaker should be opened occasionally to keep the contact surfaces clean by the wiping action of the brush on the contact block and thereby prevent oxidation with its consequent overheating, which might occur if the circuit-breaker is allowed to remain closed for very long periods.
	Inadequate spring tension.	Adjust the tension as necessary.
	Loose terminal connection.	Re-make connection securely after cleaning contact surfaces.
Breaker will not close.	Setting of overload relays too low.	Increase setting to correct value.
	Worn or defective tripping mechanism.	Overhaul mechanism by effecting any adjustments or renewals necessary.
	Closing coil circuit of automatic breaker open-circuited due to defective operating switch, coil or wiring.	Locate and repair fault or adjust operating switch as may be necessary.
Breaker will not open on overload.	Setting of overload relays too high.	Reduce setting to correct value.
	Defective tripping mechanism.	Overhaul and adjust as necessary.
Arcing between poles.	Burnt, broken or missing arc shields.	Renew or replace shields.
	Metallic veins or carbonised path in insulation base.	Clean and re-surface insulation leakage path if practicable. Otherwise renew the insulation base.

OIL CIRCUIT-BREAKERS

SYMPTOM	CAUSE	REMEDY
Overheating.	Overloading.	Reduce load or fit larger circuit-breaker.
	Defective contact.	Overhaul, adjust, or renew contacts. It may be helpful to measure the actual contact resistance with a "ducter" or similar instrument and compare it with the resistance of a contact of a healthy breaker in new condition.
	Contacts badly aligned.	Re-align correctly.
	Inadequate spring tension.	Increase tension as necessary. The pressure should be checked by means of a spring balance, and in the absence of any maker's recommendations, the spring pressure may vary from 12 lb. per finger of $\frac{1}{4}$ in. to $\frac{3}{4}$ in. width of flat contact type to 20 lb. for a line contact of similar width.
	Loose terminal connections.	Re-secure connections, after cleaning contact surfaces. Care should be exercised when spanner-tightening the terminal end of contact stems, and this should be done with the breaker closed, otherwise the contact block at the lower end may be twisted out of alignment.
Breaker will not close.	Closing mechanism worn or defective.	Overhaul, adjusting or renewing the component parts as may be necessary.
	Broken insulator throwing contacts out of alignment.	Renew defective insulator.
	Contacts loose and displaced out of alignment.	Secure and re-align contacts.
	Faulty under-voltage release coil.	Repair or renew coil.

SYMPTOM	CAUSE	REMEDY
Breaker will not close (*cont.*)	Break in under-voltage release coil circuit due to:— (*a*) Defective wiring, connection, or auxiliary contacts. (*b*) Open interlock switch, which may be due to motor starter or slip ring short-circuiting gear, transformer tap changing switch, or other form of associated equipment not being correctly positioned.	(*a*) Locate and repair defect or re-make connection. (*b*) Check such auxiliary equipment, effect any necessary correction of position of operating handles and restore circuit conditions to normal.
	Defect in operating circuit of automatically operated breaker.	Trace and repair defect, which may be in closing switch, battery circuit, etc.
Breaker closes but will not stay closed.	Overload trip setting too low or inadequate time lag, or time lag fuse blown, or oil dashpot empty or containing unsuitable oil.	Increase overload trip or time lag setting as necessary, or renew time lag fuses (these should in any event be renewed about every two years to avoid premature blowing through deterioration), or refill oil dashpot with correct grade oil.
	Faulty overload trip relay. (Normally closed contacts may be open.)	Overhaul and adjust relay as necessary.
	Worn or defective tripping mechanism.	Carry out any overhaul, adjustments or renewals necessary.
Breaker will not open.	Contacts welded together.	Isolate breaker, open contacts and overhaul contact surfaces.
	Tripping mechanism faulty.	Isolate breaker, and overhaul mechanism as necessary.
	Defect in operating circuit of automatically operated breaker, such as faulty battery or short-circuited stop switch.	Locate and remedy fault.
Breaker closes, but there are indications of one phase being open-circuited.	One contact not making, due to maladjustment or defect in one leg, such as a badly burnt contact.	Adjust or renew defective contact.

CONTACTOR TYPE STARTERS

SYMPTOM	CAUSE	REMEDY
Contactor coil overheating.	Short-circuited turns in coil.	Fit spare coil and repair or rewind faulty coil.
	Excessive voltage at coil terminals due to: (*a*) Incorrectly rated coil having been installed. (*b*) Supply voltage permanently increased since the coil was originally installed. (*c*) Coil being incorrectly connected (e.g. across two lines of a three-phase supply instead of between one line and neutral).	(*a*) Fit suitable replacement coil. (*b*) Fit new coil suitable for operation on the new voltage. (*c*) Re-connect coil correctly.
Contactor coil overheating, accompanied by chattering of contactor.	Presence of an air gap between the armature and core of coil, thereby resulting in a reduction of the reactance of the coil circuit and excessive current in the coil, due to:— (*a*) A film of dust on the core and armature faces. (*b*) Faulty adjustment of contacts, excessive pressure of which will prevent the armature being pulled right against the core. (*c*) Fracture of the copper band which encircles part of the core face for the purpose of evening out the magnetic flux over the varying cycle of a.c. voltage. (*d*) Contacts worn or out of alignment. (*e*) Intermittent open circuit in the coil circuit, which may be due to defective auxiliary contacts or terminal connections.	(*a*) Remove by cleaning. (*b*) Adjust contacts and contact pressure as necessary. (*c*) Renew defective band. (*d*) Renew or re-align contacts as necessary. (*e*) Trace and repair defect.

SYMPTON	CAUSE	REMEDY
Unnecessary tripping.	Defective contact, connection, auxiliary contactor, electrical interlock, etc., resulting in intermittent breaking of the tripping circuit.	Locate and repair defect. The use of a straight line schematic wiring diagram simplifies the tracing of faults in control circuits incorporating extensive wiring and equipment, by facilitating the sequence testing through the various circuits.
	Opening of tripping contacts by excessive vibration transmitted to the starter as a result of unsuitable location.	Re-install starter in a more suitable position free from vibration, or take whatever steps are necessary to prevent transmission of vibration to starter.
	Insufficient time delay between sequence operations such as the automatic change-over from star to delta connection of the motor winding, or the cutting out of the rotor starting resistance, due to defective or incorrectly adjusted delay mechanism.	Overhaul and adjust the delay mechanism as necessary.
	Overload trip or time lag setting too low.	Increase to normal setting.
	Excessive voltage drop at contactor coil terminals due to:— (*a*) Overloaded supply system.	(*a*) This is beyond the control of the consumer, but if desirable a step-up voltage transformer might be installed for use when required.
	(*b*) Defective contact or connection at fuse board, switch or starter, resulting in a high resistance fault.	(*b*) Trace by checking voltage through circuit and remedy defect.
Contactor starter will not function.	Defective "start" push button.	Repair or renew push button.
	Break in starting-coil circuit due to:— (*a*) Open circuit in coil.	(*a*) Repair or renew coil.
	(*b*) Defective terminal connection, auxiliary contact, switch or wiring.	(*b*) Trace and repair defect.
	(*c*) Series interlock switch, float switch, etc., defective or associated equipment in the wrong position.	(*c*) Locate and repair or renew defective component, or return the associated equipment to the correct position for starting.
	(*d*) Control circuit fuse blown.	(*d*) Renew both fuses.
	(*e*) Incorrect conditions for "sequence" starting of motors.	(*e*) Restore the normal circuit conditions.
	Insufficient voltage at starter contactor coil terminals due to:— (*a*) Excessive drop in supply voltage.	(*a*) If circumstances warrant it, install a step-up voltage transformer for use when necessary.
	(*b*) High resistance fault in the starting circuit.	(*b*) Trace by checking voltage through circuit and repair defect.

D.C. FACE PLATE STARTERS
(Also, A.C. Rotor Starters, where applicable)

SYMPTOM	CAUSE	REMEDY
Overheating.	Current rating of resistance elements too low.	Replace by suitably rated elements.
	Starting resistance left in circuit too long due to too frequent operation of starter, which might be brought about by "inching" or other similar operations.	Intermittently rated resistance elements may require replacing by continuously rated elements suitable for such frequent operation. If necessary, the makers should be consulted to confirm the maximum number of starts per hour, etc., for which the equipment was designed.
	Too lengthy starting period.	Eliminate any undesirable conditions such as heavy starting loads necessitating excessively long starting periods.
	Starter handle left in an intermediate position, thereby leaving a portion of the starting resistance permanently in circuit.	Care should be exercised to ensure the handle being put right over into the "running" position, and if the trouble is due to a defective "hold-on" coil or spring, the faulty part should be suitably overhauled or renewed.

SYMPTOM	CAUSE	REMEDY
"Hold-on" coil overheating.	Short-circuited turns in coil.	Repair or renew defective coil.
	Defective shunt field coil in series with "hold-on" coil, resulting in excessive current through the latter. (In this case the motor speed would be affected.)	Locate and repair defect in field coil.
Handle remains in "on" position after the supply is disconnected.	Residual magnetism holding armature in contact with core of "hold-on" coil.	Provide an air gap in the magnetic circuit by fitting a brass insert or studs in the face of the iron core. A trace of transformer oil on the contacts will also assist by reducing the friction.
	Defective handle return spring.	Fit a new spring.
Handle remains in "on" position after operation of a remote tripping switch (which when closed, short circuits the "hold-on" coil terminals).	Resistance of the lengthy leads between starter "hold-on" coil and trip switch being so high that sufficient current still passes through the coil for it to hold on after the trip switch has been closed.	Modify the tripping arrangement by connecting the "hold-on" coil across the supply in series with a suitable resistance and a normally closed push button to trip when opened.
Handle fails to hold in "on" position.	"Hold-on" coil defective in operation.	Repair or renew defective coil.
	Defect in "hold-on" coil circuit resulting in high resistance or intermittent break (loose terminal connection, etc.). If the coil is in series with shunt field of motor, erratic operation of the latter would be experienced.	Trace and repair defect.
Arcing between fixed and moving contacts during starting.	Moving or fixed contacts worn.	Overhaul, adjust or renew contacts.
	Fixed contacts not correctly aligned.	Align contact surfaces correctly, checking by means of a straight edge.
	Open circuit due to a broken connection, lead, or resistance element. (This would result in erratic starting performance.)	Locate and repair defect.
	Fractured contact base plate resulting in defective contact.	Renew defective base plate.
	Tracking and carbonisation of base plate between adjacent fixed contacts.	Clean and polish the affected part of the insulation, or fit a new base plate.

A.C. THROW-OVER STARTERS (Star Delta, etc.)

SYMPTOM	CAUSE	REMEDY
Handle will not remain in "off" position and may fall into "start" position.	Handle "return" spring defective or missing.	Fit new spring.
Handle fails to return to the "off" position when current is switched off.	Handle "return" spring defective or missing.	Fit new spring.
	Excessive friction at contacts.	Trim contact surfaces and smear lightly with vaseline or transformer oil, to reduce contact friction.
	Under voltage release plunger sticking due to dust deposits, etc.	Adjust plunger to move freely.
	Defect or excessive friction in tripping mechanism.	Overhaul mechanism as necessary.
	Suction between release solenoid core and armature contact faces due to oil and dust.	Thoroughly clean the contact faces.
	Residual magnetism in release solenoid core.	Clean the core and armature contact faces, and if the trouble persists arrange a very slight gap in the iron circuit at the contact faces.

SYMPTOM	CAUSE	REMEDY
Handle will not remain in the "running" position.	Retaining mechanism worn or incorrectly assembled.	Overhaul mechanism, effecting any necessary renewals of component parts.
	Under-voltage release coil not energised due to open circuit in coil or wiring.	Locate and repair defect.
Under voltage coil overheating.	Short-circuited turns in coil.	Repair or rewind coil.
	Solenoid plunger displaced or missing altogether.	Replace plunger in correct position.
Overheating at starter contacts.	Contacts incorrectly positioned and adjusted.	Overhaul, renewing any defective contacts and adjusting contact pressure as may be necessary.
Motor hums but will not start.	Open circuit in one phase of starter circuit, due to defective contact, terminal connection or interconnected wiring.	Trace and remedy defect in starter.

AUTO-TRANSFORMER STARTERS

SYMPTOM	CAUSE	REMEDY
Overheating.	Short circuits in winding.	Locate and repair defective portion of winding.
	Overloading, with resultant excessive current consumption during starting period.	Reduce starting load, which may be high due to excessive friction or defect in driven machine, or line shafting. The normal starting period should not be habitually exceeded to overcome heavy starting loads.
	Excessive voltage drop at starter terminals.	If the condition is permanent, a higher voltage tapping should be used.
Motor will not accelerate due to inadequate starting torque.	Starting voltage too low.	Increase voltage tapping as necessary.
Motor accelerates too rapidly.	Starting voltage too high.	Reduce voltage tapping as necessary.
	Short-circuited turns in transformer winding.	Locate and repair defective portion o winding.

LIQUID ROTOR STARTERS

SYMPTOM	CAUSE	REMEDY
Sparking at electrodes.	Electrodes insufficiently immersed in the electrolyte in the "start" position.	Adjust the level of the electrolyte.
Excessive current surge on switching in.	Solution too strong.	Adjust the strength of the solution as necessary to obtain smooth starting and acceleration. A 10% solution by volume is normally used and can be obtained by adding 1 lb. of washing soda to each gallon of water used.
Excessive current surge when dippers short circuited.	Solution too weak.	

NOTE 1.—In the case of switch fuses controlling motors, there is often a tendency for the fuse sizes to be reduced unduly with the intention of providing protection against overloading, but it should be stressed that, in the main, fuses cannot and are not intended to protect the motor against overloading. Even with the best type of cartridge fuse the ratio between blowing current and normal running current is rarely less than 1·4, and this is far too great to give any protection against small sustained overloads. The function of the fuse is not normally regarded as protection of the motor but protection of the wiring and to provide ultimate protection against faults beyond the rupturing capacity of the starter. The normal current rating of the fuse should be substantially higher than the full load current of the motor (the actual figure depending on the type of fuse), and adequate protection against overloading of the motor should be provided by magnetic or thermal releases.

E.D.A. AGAIN URGES ABOLITION OF P.T.

CONTINUING their campaign for the removal of purchase tax from domestic electrical appliances, the Electrical Development Association sent a letter and memorandum to each M.P. sitting in the new Parliament, to reach them when they assembled at the House last week. The Association has been advocating this remission of purchase tax for some six years now, maintaining that electrical appliances are not luxuries, but necessities in the home.

In its memorandum—an eight-page pamphlet entitled "The Case for Removal of Purchase Tax"—E.D.A. poses and answers the several questions involved. Particular emphasis is laid on the aspect of fuel economy, and in this connection it is asked whether the tax is justified on those grounds. This notion is, however, rejected as most electrical appliances are in fact claimed to be fuel savers.

The cases in favour of individual appliances have been enumerated methodically, although a notable exception is any reference to electric fires and radiators which are named as the primary cause of peak hour problems, and which were the subject of a statement by the former Minister of Fuel and Power early last month, when he said production of fires would be cut again next year to save power.

Lamps and lighting fittings, on which there was a tax of 33⅓%, could in no way be considered luxuries, and were of great importance in the introduction of electricity to many of Britain's rural communities. A vacuum cleaner was one of the most labour saving devices in the home, consuming a negligible amount of electricity, yet tax on that article was doubled in this year's budget to 66⅔%. Similar treatment was meted out in the same budget to washing machines, refrigerators, irons and others. The booklet also deplores the discrimination between gas and electric water heaters. Tax on the former was reduced in 1948 to 66⅔%, while electrical appliances retained the 100% rate.

An appendix to the memorandum sets out in tabular form the budgetary fluctuations on the more notable appliances since October, 1945. This table includes fires and radiators (increased to 75% in 1947 and to 100% the following year) and not commented upon in the body of the booklet.

Social Implications of Television Viewing

THE social implications of television have been causing considerable interest in the past few years, and opinions have varied from regarding t.v. as a source of educational and uplifting activity to blaming it for juvenile delinquency and crime. The true value lies of course somewhere between these two extremes, and data are now being accumulated which enable a more accurate assessment to be made.

Some factors involved were covered at a discussion on "The Social Implications of Television" opened by Mr. F. H. Townsend at the I.E.E. last week.

An interesting point raised by Mr. Townsend was the difference in findings between American surveys and the B.B.C. Audience Research Department. The latter concluded that the effect of television viewing on the social habits of people in Britain was much less than might have been expected, their "away from home" activities being only affected to a slight degree once the initial novelty had worn off. The chief sufferer in "stay at home" activities appeared to be the sound radio receiver.

In America, much information—some of it mutually contradictory—had been gathered. It was generally agreed, however, in both countries that the greatest potential harm lay in the effect of viewing by children. Reports from the U.S. indicated that it was by no means uncommon for children to spend more than four hours a day watching a television programme, and owing to the "sponsor" system and the number of alternative programmes available there was bound to be a gravitation to the worst type of entertainment. In this country, the B.B.C. took its responsibilities towards children very seriously and although the problem was not so difficult as in the U.S. a fair amount of parental control was necessary.

The Opener then suggested that regional programmes should be provided and that consideration should be given to sponsored programmes.

In the ensuing discussion, it was pointed out that a survey conducted among a limited number of public schoolboys showed that viewing hours varied from two to eight per week. It was thought that the educational possibilities of television had not yet been exploited to any great extent. Work was, however, being done on this subject. Several widely differing opinions were expressed on the television of orchestral and instrumental work, on the effect of t.v. on attendances at outside functions which might be televised, and on the effect of alternative programmes.

The excessive time spent in viewing by some American children was thought to be a grave danger against which precautions could not be taken too early. Adequate parental control provided the solution and the view was expressed that the danger was greater in America where several all-day programmes were broadcast, than in this country with the restricted hours.

The advantages and disadvantages of all-day and sponsored programmes were fully discussed and misgivings were expressed as to the effects of the former on the performance of necessary household tasks.

overseas news

Another Port Augusta Station?

Work will probably begin next year on a second power station at Port Augusta, Mr. R. H. M. Lea, chief engineer and general manager of the Electricity Trust of South Australia, stated recently. The new station would probably cost over £20 millions, and would be in operation by 1957-58—before atomic power could reasonably be expected, he pointed out. When the two stations reach full production, they will require 2½ million tons of Leigh Creek coal a year, and Mr. Lea stressed that every effort was being made to determine the proved recoverable reserves at Leigh Creek—indications so far were favourable that the 70 million tons needed would be found.

Larger Snowy Scheme?

The power capacity of the Snowy Mountains scheme might be increased by about 400,000 kW. to nearly 3,000,000 kW. by alterations at generating stations, Senator W. H. Spooner, Minister for National Development, revealed recently. Since the formation of the Snowy Mountains Authority in 1949 investigating engineers had been reviewing and advancing the plans which the Commonwealth, Victorian and New South Wales Governments had prepared. The authorities did not propose any major variations of the general layout of the scheme, he said, but provision of considerably greater storage on the Eucumbene River near Adaminaby would provide the extra water and would increase the power output. Construction of the larger dam required for the increased storage would be almost at the site originally selected.

Tasmania's Profit

The 12 months' working, ended June 30 last, of the Hydro Electric Commission of Tasmania resulted in a surplus of £10,279. But if interest on hydro-electric loan for works under construction had been charged to revenue, as in former years, the accounts would have shown a loss of £77,562, the audit-general pointed out when the report was tabled in the House of Assembly recently. Gross income at £1,646,085 was £177,040 more than the previous year.

A Ten-year Plan

A plan to almost complete electrification in Victoria within ten years, has just been published by the State Electricity Commission—but the report was prepared before the recent cuts in capital expenditure. In the report, the Commission estimates that it would cost about £45 millions to carry out this final phase of Victoria's electrification on the basis of present price levels. As an essential corollary to the plan it is proposed that ten metropolitan electricity undertakings should be transferred to the Commission to consolidate the whole electricity supply position. Connection of about 178,000 new consumers outside the metropolitan area is anticipated, leaving only about 15,000 homes in the State without a supply. In the course of the ten-year period 48 small local undertakings would be acquired and supply extended to about 1,250 new localities. The plan includes the development of four new supply regions with an estimated total of about 35,000 potential consumers in the west and north-west of the State. But in view of the present financial situation, it is locally expected that the scheme will be pigeon-holed.

Copper Shortage

A serious shortage of many metal articles in about nine months, unless overseas supplies of copper can be obtained, has been forecast in Australia. Because of the restrictions on the use of dollars, Australia has been getting supplies of copper from the Belgian Congo and Southern Rhodesia. Stockpiling by the Governments of these countries has now cut off their supplies to Australia, and this could cause a serious shortage of copper there. The Australian production of copper is only 15,000 tons a year compared with annual requirements of 55,000 tons.

Price Maintenance

Canadian manufacturers of electrical appliances are perturbed at a proposal for Federal legislation which would forbid makers to set the prices at which their products were to be sold, it is reported. The Government's planned action follows an interim report from the MacQuarrie Committee, which referred to the enforcement of minimum re-sale prices as "manifestations of a restrictive or monopolistic practice which does not promote general welfare." Some time ago the Canadian Electrical Manufacturers' Association submitted a brief to the committee which has now been made public. In this, the Association agreed that price maintenance applied only to 10% to 15% of all retail sales, these generally being products that require costly demonstration and free service while consumer-acceptance is achieved. Instruction in operation and skilled maintenance are important in order to ensure long and efficient service. The manufacturer is entitled to suggest a price that will provide this service and should have the right to grant his sales franchise to dealers who discharge this responsibility. Benefits from mass production can be realised only if goods are distributed in orderly fashion. Such benefits can be lost through erratic marketing conditions which prevent a manufacturer from maintaining quality and continuity of production. In the opinion of the Association, the large number of manufacturers, together with imported electrical products, ensures keen competition and prevents individual manufacturers

from establishing or setting prices that are either too rigid or too high.

Manitoba's Plan

Upon completion of this year's £7,000,000 rural electrification programme, the Manitoba Power Commission will have extended its supply to 27,000 farms—more than 58% of all farms in the Province—yet only six years ago those supplied amounted to about 2% of the total. The plan of rural electrification for Manitoba was evolved in 1942 when a special commission appointed by the provincial government recommended it would be feasible to serve all farms within a designated area which would establish the practical service area of the province. At that time, hydro service had been extended to only 1,000 farms located adjacent to existing l.v. lines. Implementation of the electrification programme began in 1945, in which year somewhat less than 1,000 farms were served on a test basis. Subsequently an annual target of 5,000 farms was decided upon but shortage of trained men and materials prevented the attainment of that goal until 1948.

Modernisation

The modernised Buntzen power station of the British Columbia Electric Co., was officially put into operation recently. This hydro-electric station, on Lake Buntzen, now has one 70,000 h.p. generator which replaces seven old units, two of which had been in operation since 1903.

Railway Electrification

A four-year railway reconstruction scheme is under consideration by the Italian Minister of Finance. One section of the proposals concerns the electrification of the lines Barcellona-Palermo, Messina-Catania and Milan-Padua, which would cost 97,000 million lire, it is estimated. Cost of the total programme is put at 160,000 million lire.

More Power

Tasan power plant, now under construction in West Sweden for the city of Karlstad and the steel and timber group, Uddeholms A.B., will operate on a head of 880 ft, the highest on record in Sweden, it is stated. The new power station, which will cost Kr.32,000,000 (£2,207,000), is expected to generate 75 million kWh annually. The building of the plant has involved the construction of an artificial lake 7½ miles in length and half a mile wide.

No Inter-Island Supply

Mr. A. E. Davenport, general manager of the New Zealand State Hydro-Electric Department, told delegates at the annual conference of the South Island Local Bodies' Association that the South Island would not be asked to supply electricity for the North Island in his term of office at least, if at all. The present government deemed it essential to reaffirm the decision of the previous government to hold the load growth to 5% a year instead of 6·5 %, which the South Island had been accustomed to over the past 10 years. Until the Roxburgh scheme was completed, the South Island people need not fear that a cable was to be run across Cook Strait to take power to neighbours in the North. The South Island would eventually become one electric entity. Power resources would be pooled. He affirmed that the Roxburgh project was entirely satisfactory, despite some people's suggestions of the reverse being the case. The initial installation at Roxburgh is for 160,000 kW of plant, he said, which, in a year, would generate 840,000,000 units of firm power.

Objection

The Taupo Town Board power scheme was severely criticised at a meeting of the board by Mr. J. D. Swan, deputy chairman, who moved that all work on the scheme be held up until a specially appointed committee had reported on the scheme to a meeting of the ratepayers. Mr. Swan also challenged the necessity of increasing the present loan of £82,000 to £110,000. The resolution was not seconded. As only one tender had been received for the construction of the headworks and powerhouse, it would be inadvisable to delay the scheme any further, said Mr. J. E. Story, chairman. It was decided that the work should proceed and that the scheme should be submitted to the ratepayers as soon as possible.

Contract For Power Plant

The Argentine Government has confirmed a contract to a German consortium comprising Siemens-Schuckertwerke A.G., A.E.G., of Berlin and I. and C. Steinmuller, for building a 300,000 kW thermo-electric power station at San Nicolas, 200 miles north of Buenos Aires, during the next three years. It is understood that it will be the largest plant of its kind in South America and is to cost about 300 million marks.

Another Station

A new hydro-electric generating plant known as Juan Carosio-Moyopampa was opened near Chosica, Peru, recently. A second similar unit of 30,000 kVA is expected to be in operation before the end of 1951, leaving one further unit to be completed later. The station was designed for the Compania de Energia Hydro-electrica Andina (Hidrandina) by the Swiss firm Columbus S.A., and built by the local subsidiary of the Danish contracting firm of Christiani and Nielsen. Hidrandina have an agreement with the Lima Light and Power Co. whereby the output of the plant will be utilised by the latter concern.

Charges Up

The revised plan of the Japanese Public Utilities Commission proposing an average increase of about 30% in electric power charges has been officially approved, and the Commission gives to the nine supply companies formal authorisation to increase their charges. The new plan was drawn up on the basis of the estimated cost totalling Y104,100 million as against the total of Y105,300 million under the previous plan for a 31% increase.

PERSONALITIES

IN THE INDUSTRY

Newly promoted to the position of station superintendent at Hams Hall "B" power station, Midland Division, B.E.A., is **Mr. E. H. Cook,** A.M.I.E.E., as we briefly noted last week. He joined the Birmingham Corporation undertaking as a trainee in 1929, serving in every section of the station and completing his training in the control room at Nechells. At the latter station he was appointed boiler-house shift engineer in 1934, but five years later transferred to Hams Hall "A" in a similar capacity. When the Hams Hall "B" station was completed in 1942 he became shift charge engineer, and has subsequently held the position of combustion engineer, and, latterly, deputy station superintendent. Actively associated with social affairs, he is at present vice-chairman of the Central Management Committee of the Midlands Electricity Sports and Social Club. Mr. Cook was educated at Moseley secondary school and the Birmingham Central Technical College.

Mr. E. H. Cook

There is more than usual interest in the announcement that sales representation for Lancashire Dynamo and Crypto (Mfg.) Ltd., in Northern Ireland is now in the hands of Burke and Son, Ltd., of 18 Strangford Avenue, Belfast, for **Mr. J. McCandless,** M.Sc., M.I.E.E., M.Inst.F., until recently deputy city electrical engineer and general manager at Belfast, is now a director of Burke and Son, and will act as manager for Northern Ireland. Readers will recall the recent controversy at Belfast over the question of whether the Corporation should reinstate Mr. McCandless at an increased salary, after he had handed in his resignation in order to take up a post with the manufacturing side of the industry.

Mr. W. H. Keith, assistant area manager of the North of Scotland Hydro-Electric Board's Shetland Area, has been appointed area manager for the Lochaber Area, the headquarters of which are at Bank Street, Fort William. He succeeds **Mr. W. L. Fraser,** who has retired.

Mr. C. H. T. Johnson and **Mr. S. R. Tanner** have been appointed to the board of Decca Radar, Ltd.

Mr. Leslie S. Seccombe, has been appointed chairman of Electrical Components Ltd., and **Mr. A. T. Haywood** and **Mr. C. C. Scott,** have been appointed joint managing directors.

Many new Ministerial appointments were announced from No. 10 Downing Street last week. Among these was that of the **Rt. Hon. Geoffrey William Lloyd** as Minister of Fuel and Power. He held office in the war-time administration as Secretary for Mines, and Secretary for Petroleum, and Parliamentary Secretary to the Ministry of Fuel and Power. From 1946 to 1949 he was a Governor of the B.B.C. The new President of the Board of Trade is **Mr. G. E. P. Thorneycroft,** who became Parliamentary Secretary to the Ministry of War Transport in 1945. The **Hon. John Scott Maclay,** C.M.G., who is now Minister of Transport and Civil Aviation, has been chairman of the British Committee of the International Chamber of Commerce, and served in the R.A. before being seconded to the Ministry of War Transport in 1940. The new Minister of Supply, the **Rt. Hon. Duncan Sandys,** served in the war-time Government as Parliamentary Secretary to the Ministry of Supply, and as Minister of Works. The appointment of **Lord Leathers** as Secretary of State for the Co-ordination of Transport, Fuel and Power, we dealt with last week, but we also note that **Sir Peter Bennett,** O.B.E., J.P., has become Parliamentary Secretary to the Ministry of Labour and thus relinquishes his chairmanship and joint managing directorship of Joseph Lucas, Ltd. The **Rt. Hon. Lord Cherwell,** F.R.S., as Paymaster-General, is specifically charged with the supervision of atomic energy production and with the direction of the Prime Minister's statistical branch. Appointed Parliamentary Secretary to the Ministry of Fuel and Power is **Mr. L. W. Joynson-Hicks.**

Lord Leathers

Rt. Hon. G. W. Lloyd

Rt. Hon. Duncan Sandys

As we briefly noted last week, **Mr. Arthur Parkinson,** M.A. (oxon), has been appointed to the board of directors of Crompton Parkinson Ltd. In consequence he has ceased to be an executive director of the company and has relinquished the position of assistant general sales manager of the Plant Division of the Sales Dept. He is to undertake special duties assigned to him by the board of directors. A son of the late Mr. Frank Parkinson, he was educated at Mill Hill School, then became an apprentice at C.P.'s Chelmsford works and later went to Wadham College, Oxford. In 1937, he spent some time in the firm's Australian Works and on returning to England in 1938, was appointed works manager of the Fan and Small Motor Factory at Edmonton. From 1939-46 he served in R.E.M.E. and the Ministry of Supply. In 1946, he was appointed lamp sales manager of the C.P. Supplies Division, and in 1947 assumed the position of assistant general sales manager, Supplies Division.

Mr. Arthur Parkinson

Mr. S. S. C. Mitchell, C.B., O.B.E., M.I.Mech.E., has been appointed Controller of Guided Weapons and Electronics in the Ministry of Supply, in succession to Air Chief Marshal Sir Alec Coryton. Mr. Mitchell is in charge of all work in research, development and production of guided weapons in Britain, and is also responsible for the direction of the Ministry of Supply's work on electronics research, development and production. Since October, 1945, he has been head of the Armament Design Establishment (now under the Ministry of Supply).

District manager at Croydon to the South Eastern Electricity Board, **Mr. E. A. Hawkins,** B.Sc.(Eng.), A.M.I.E.E., has been appointed to the headquarters of the B.E.A. as chief assistant engineer, System Operation Branch, in the Chief Engineer's Department. He takes up his new duties at the beginning of next month. Prior to vesting day, Mr. Hawkins had been deputy engineering manager of the Islington Borough Council's Electricity Department for two years. Previously he served for about nine years with the Central Electricity Board, latterly as commercial assistant at head office, but his earlier experience was gained with the Gt. Yarmouth undertaking.

At the recent meeting of the Council of the Bradford Industrial Safety and Welfare Association, **Mr. P. Evans,** general manager, English Electric Co., Ltd., Thornbury, Bradford, was elected President. Honorary secretary is **Mrs. M. Booth,** Welfare Officer to Bulmer and Lumb, Ltd., and the honorary treasurer is **Mr. E. Bastow,** also of the English Electric Co., Ltd.

Wednesday of last week was an important day in the life of **Mr. Alan East,** A.M.Inst.C.E., M.I.E.E., M.I.Mech.E., chief engineering inspector to the Electricity Division of the Ministry of Fuel and Power. For it was on that day that he was invested with the C.B.E. by H.R.H. The Duke of Gloucester, in the absence of H.M. The King. The award was noted in the King's Birthday Honours list back in June.

Mr. Alan East

Mr. East is, of course, well-known in the Supply Industry—he was engineering inspector with the old Electricity Commission from 1919 until dissolution in 1948.

The Kelvin Gold Medal for 1950, has been awarded to **Dr. Theodore von Karman,** F.R.S., Professor of Aeronautics and Director of the Guggenheim Aeronautic Laboratory of the California Institute of Technology, in recognition of the eminent services he has rendered to engineering science in those branches of engineering work with which Lord Kelvin was especially identified, and to commemorate which that Medal was instituted. The presentation was made at the Institution of Civil Engineers last Tuesday.

Resigning his position with Chamberlain and Hookham, Ltd., **Mr. Eric W. Marchant,** B.Eng. M.I.E.E., has joined a former C.E.B. colleague, Mr. C. P. N. Rand, as a director of Electrical and Engineering Products, Ltd. Mr. Marchant spent his early days with Messrs. Highfield and Roger Smith; proceeding thence to the North-East England Area of the Central Electricity Board in 1933. In 1937 he joined the sales staff of Chamberlain and Hookham in London, and during the war served in the Navy, being appointed to the rank of Electrical Commander. Mr. Marchant's main interest will now be with transformers manufactured by Bonar Long and Co.

On Tuesday last, **Mr. Allan S. Quartermaine,** C.B.E., M.C., B.Sc., M.Inst.C.E., took over duties as the President of the Institution of Civil Engineers for the current session. Incidentally, he retires to-morrow (Nov. 9) from the position of chief engineer, Western Region, British Railways.

Lord Simon of Wythenshawe's chairmanship of the British Broadcasting Corporation comes to an end next month. He gives up the post at the time the present B.B.C. charter expires.

Mr. R. Stokes, Lord Privy Seal and Minister of Materials in the late Government, is rejoining Ransomes and Rapier, Ltd., as chairman and managing director and Cochran and Co. (Annan), Ltd., as managing director.

Mr. D. E. Jewitt, M.I.Mar.E., who was associated with the marine work of the British Thomson-Houston Co. since 1910, and was appointed engineer, Marine Dept. in 1943, has retired after 45 years' service with the company.

Now in this country on a brief visit are four chief officers of the Electricity Supply Commission of South Africa. They are **Mr. G. R. D. Harding** and **Mr. P. Furness,** joint general managers, **Mr. D. B. Reay,** chief mechanical engineer, and **Mr. I. de Villiers,** chief electrical engineer. They are returning to South Africa early next week.

Over 100 colleagues, past and present, assembled at the headquarters of the Southern Sub-Area of the London Electricity Board last Thursday to wish **Mr. R. H. Starkey** a long and happy retirement after fifty years' service in the Supply Industry. On their behalf, **Mr. S. Eclair-Heath,** the sub-area manager, presented him with a portable typewriter, tea trolley and an electric kettle, paying tribute to the extremely conscientious service Mr. Starkey had given to the industry and emphasising the friendly co-operation and assistance he had always given so unstintingly. Mr. Eclair-Heath also expressed his thanks personally to **Mrs. Starkey** and presented her with a leather handbag. Mr. Starkey commenced his electrical career in March 1902, with the Blackheath and Greenwich District Electric Light Co. Ltd., which later became the South Metropolitan Electric Light and Power Co. Ltd., and held a number of positions with that concern. Soon after Vesting Day he was appointed as Section Head, Tariffs and Statistics, in the L.E.B. Commercial Department at Sub-Area Headquarters.

Two new executive appointments have been announced by Automatic Telephone and Electric Co. Ltd. **Mr. F. C. Burstall,** formerly export director has been appointed joint general manager, and **Mr. R. H. G. Lee** has been appointed to the post of export director.

OBITUARY

Mr. J. L. Carr, M.Sc., M.I.E.E., technical and research engineer to the North Western Electricity Board, died on November 4. Prior to nationalisation he had been distribution engineer to the Manchester Corporation Electricity Dept. since 1944, having joined that undertaking after demobilisation from the 1914-18 war. Earlier he had gained experience with the Electricity Departments at Bradford and Sunderland, and with the Newcastle-upon-Tyne Electric Supply Co.

Mr. J. L. Carr

Mr. S. W. Gibson, A.M.I.E.E., who retired from the post of chief of the Data Dept. of the British Thomson-Houston Co. Ltd., in March 1947, died on October 31, aged 76. He was the company's representative on various B.E.A., M.A., and B.S.I. committees.

Mr. T. Dixon, F.I.P.A., late of the Dictaphone Co., Ltd., died on November 2.

Mr. C. D. Terry, a director of Herbert Terry and Sons, Ltd., was killed in a rail accident in London on October 25.

Board Employee and Press

THE broad principle of employees of an Electricity Board communicating with the Press on matters of Board policy was raised in two recent articles in the *Western Mail*. They arose from a letter written by an employee (a meter reader) of the South Wales Electricity Board, in which he made allegations concerning the Board's proposed new domestic tariff. The Board replied refuting the allegations, emphasising that no decision had yet been taken by the Board. The employee contacted his immediate chief stating that the Board's reply was a misrepresentation of the new tariff; on the matter being referred to Head Office the meter reader was told that the chairman would like to see him along with his union representative, meanwhile it was an instruction that he should not write further to the Press on the matter. He did not keep the appointment but handed in his resignation. On contacting the Board, we were told that its relationship with the Press is generally quite amicable, but employees could not be permitted to make erroneous statements, and, on the basis of such statements, publicly to criticise their employers.

ACCIDENT AT DERBY

A SERIOUS accident, resulting in an interruption to power supplies occurred at Derby Power Station on Monday night. Mr. S. Torr, Charge Engineer, of Lyndhurst Grove, Chaddesden, and Mr. H. Bamford, Assistant Engineer, were engaged on switching operations on the main switchboard when an explosion occurred. Mr. S. Torr, who was at the top of a ladder, was fatally injured, and Mr. Bamford received badly burnt hands and was removed to hospital.

The resulting fault caused a blackout, starting at 5.30 p.m., over a large area of Derby and surrounding district, but supplies were restored to most areas in 75 minutes. Certain areas, however, were without power at midnight, and full service was not restored until Tuesday morning. Further details of this unfortunate accident are awaited.

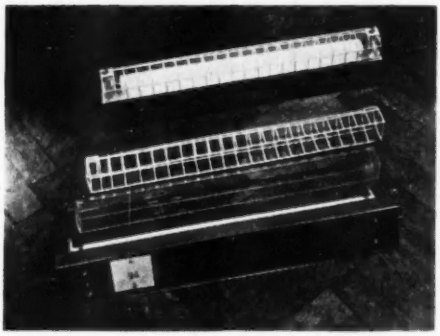
Earlier in the day there was a breakdown in the district when leaves in the River Derwent blocked the water intake screen at the power station. Local factories were at a standstill for about half-an-hour.

The BUYER'S *Column*

Fluorescent Garage Lamp

RECENTLY introduced by SCEMCO LTD., Soho Street, London W.1, is an interesting and useful portable fluorescent lamp designed for use in garages and other situations where a good standard of illumination is required in awkward inaccessible places.

Scemco's handy fluorescent lamp seen complete and "exploded"



This utility fluorescent shadowless lighting unit produces no heat, no shadow and the minimum of glare. It comprises a 2-ft, 20-W fluorescent lamp sealed in a Perspex casing, in turn protected by a strong wire cage. The body is mounted on four castors for ease of movement. Trade price is £5 5s., with 2s. 9d. purchase tax on lamp.

A New Lighting Plant

AN interesting addition to the range of domestic and industrial electric power and lighting plants by A. C. MORRISON (ENGINEERS) LTD., Rectory Place, Loughborough, embodies an air-cooled Petter diesel engine. The power unit develops 4·5 b.h.p. at 1,500 r.p.m., the electrical output being 2·5 kW at unity power factor. It is a 4-stroke cold starting, vertical, totally enclosed, compression ignition type, incorporating direct injection of the fuel and pressure lubricated valves and bearings. The generator is direct coupled to the engine, both being mounted on a sturdy cast iron bedplate with bolt holes for holding down.

A patent Morrison control box is wall-mounted. The usual four alternative controls are standard, the most popular being the fully automatic type. The alternatives are : remote control situated at any convenient location, press button on the board and hand starting of the plant.

The current is supplied at standard mains a.c. voltage so that premises already electrically wired for mains supply will find such wiring suitable for the Morrison set.

Improved Nife Inspection Lamp

AN improved version of their well-known self-contained portable inspection lamp has just been produced by NIFE BATTERIES, of Redditch, Worcs. Capable of projecting a long-range high c.p. beam, the equipment, type P.6, was designed primarily to meet the rigorous working conditions encountered in the inspection of overhead power transmission lines.

It consists of a 6-8 V nickel-cadmium alkaline battery of miners' lamp design, carried on the back of the operator and connected by flexible cable to the compact projector using a double-filament high efficiency bulb. Of all-steel construction, the battery comprises six cells of sufficient capacity to provide three to four hours light on the major 18-W filament, and about 20 hours on the 3-W reserve. It can be left for indefinite periods in a charged condition without risk of deterioration.

A push on/off switch is positioned by the projector handle to allow for easy one-handed control.

In use, the battery is contained in a stout leather case, and this, together with a leather bag for the projector, is attached to a carrying harness to give the maximum comfort and minimum fatigue when covering rough ground. Specification : dimensions of battery case 10¼ in. by 8¼ in. by 1⅞ in.; weight of complete equipment under 14 lb; battery-charge rate 2 amp for seven hours; maximum candle power 15,000.

Inspection is easy with this portable Nife lamp

Christmas Fairy Lights

NOW on the market in time for the forthcoming Festive season, the Mazda Fairy Candles by BRITISH THOMSON-HOUSTON CO., LTD., Crown House, Aldwych, W.C.2, make a useful addition to the fairy lights and Cinderella Disney Lights produced by the firm.

These are colourful and bright, having the appearance of glowing wax candles with their traditional Christmas associations. They are easily clipped to the Christmas tree or to any type of horizontal rod. Each set comprises 12 candles of various colours ready wired and complete with clips and costs £2 6s. 8d., including 25% P. tax.

The new Mazda Fairy Candles

Isolating Switch Assemblies

THE HENLEY isolating switch assemblies shown in the illustration are designed for maximum currents of 800, 1,200 and 1,600 amp, and are arranged for single-pole operation, or the three poles can be coupled together if desired. The design is robust and the action is smooth. A neutral link is included in addition to the three s.p. switches.

Fireproof barriers separate the phases, and the switches are mounted on substantial Sindanyo panels, the fixing centres corresponding to the fixing centres of the units.

Spade grip type handles are provided. The hinge contacts can be arranged either righthand or lefthand, depending on whether the incoming feeder is on the righthand or lefthand side of the distributor units.

Ring type current transformers can be fitted over the incoming fittings at the back, to operate m.d. indicators, ammeters or kWh meters.

Isolating switch assemblies for use with other Henley units (Groups 20 and 21) are available in 800, 1,200 and 1,600 amp sizes. These have the blades arranged vertically, and they can be supplied for single-pole operation or coupled in tandem. The busbar contacts are arranged at the standard centres for the relevant type of unit.

Details of dimensions and list numbers are given in supplements to Catalogues 20/1, 21/1, 22/1 and 24/1, issued by W. T. Henley's Telegraph Works, Ltd., Hatton Garden, E.C.1.

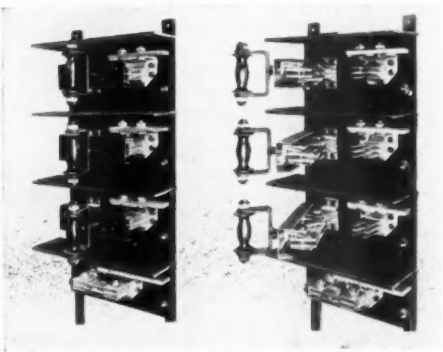
New H.M.V. Refrigerator

LATEST addition to the refrigerator models available from H.M.V. HOUSEHOLD APPLIANCES, Hayes, Middx., is the domestic model R6651. It combines up-to-the-minute developments with an attractive streamlined appearance.

Shelves and compartments are carefully arranged so that the most convenient and efficient use is made of the 6·5 c ft of space.

Outstanding features are the handy package shelf for butter, cheese, etc., a tall bottle shelf, large freeze chest, large meat keepers and "crisper" compartments and a sealed, noiseless compressor mechanism with a 1/12 h.p. single-phase a.c. motor and using Freon 12 refrigerant.

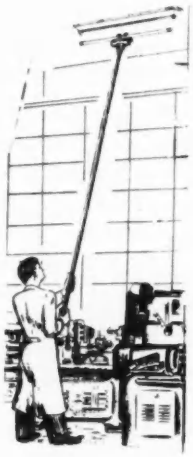
The price, including delivery, installation and purchase tax of the R6651 is 169 guineas. The refrigerator is guaranteed for one year and there is an additional four years' warranty covering the sealed refrigeration unit.



Henley's isolating switch assemblies

No Ladders for Lamp Changing

THE well-known range of "No-Climb" lamp changers made by CABLE STRIPPERS LTD., Leighton House, Potters Bar, Middx., has now been extended by the addition of a fluorescent lamp changer.



Cable Strippers' "No-Climb" fluorescent lamp changer

This lamp changer is designed to facilitate the changing of the two-pin type of fluoresecnt lamp. It follows the style of the changers designed for removing filament and MV, etc., lamps, in as much as it comprises a changer head and extendable sections of light alloy tubing.

The practical changer head comprises mechanism in which six rollers surround the lamp, two of these rollers of $1\frac{3}{4}$ in. diameter are rotated by bevel gears which rotate the lamp against the pressure of the four smaller rollers. Rotation is effected at the butt end of the tube or tubes by a moulded rubber fitment which is easily detached

The "No-Climb" unit will change bi-pin fluorescent lamps of all lengths up to a height of 15 ft from ground level. It can be operated vertically or at an angle of 45° so that lamps can be readily changed over the top of machinery and plant in operation. Recommended for use with the lamp changer are the insulated non-inflammable "Tell-Tale" markers which, diamond shaped, fit over the pins and indicate clearly whether the lamp pins are in contact in the fitting.

Portable Generating Plant

NEW type generating plants, delivery of which is expected soon in this country by the KOHLER CO., LTD., 66 Bolsover St., London W.1, include (a) Model 750AF21, a 750 W plant supplying a.c. 50 c/s 115 V current and (b) Model 2AF41, a 1·7 kW plant supplying 230 V 50 c/s single-phase current.

The first model mentioned has a Kohler Model K12 single-cylinder air-cooled petrol engine running at 1,500 r.p.m. coupled to a 750 W four-pole generator with self-adjusting brushes. Fully automatic manual or push-button starting is available. List price is £215.

Second model has a Kohler L-600 4-cylinder water-cooled engine coupled to 1·7 kW generator with rotating armature built in exciter and automatic voltage regulation. It is fully automatic in starting. List price is £403.

TRADE PUBLICATIONS

IGNITRON EQUIPMENT. Publication RS/111 is a new publication issued by the English Electric Co. Ltd. Its title, "English Electric Mercury arc tube ignitrons" is an adequate description of the subject of its contents.

CONTROL GEAR.—The range of control gear and accessories for the operation of fluorescent lamps on 200/250 V supplies which is supplied by Ekco-Ensign Electric Co., Ltd., Southend-on-Sea, Essex, is listed and illustrated in a new booklet issued last month.

CABLES.—An attractive booklet on a subject which is interesting but which does not lend itself easily to attractive presentation is Publication No. 281A, newly issued by British Insulated Callenders Cables, Ltd., Norfolk House, Norfolk Street, W.C.2, which deals with the aluminium sheathed cable produced by the company.

WELDING ELECTRODES.—The Industrial Group of Philips Electrical Ltd., Century House, Shaftesbury Avenue, W.C.2, has just published a new brochure on the "48" Arc Welding Electrode. This booklet contains full technical information on the Philips "48" together with illustrations, graphs and tables.

SILVER.—A new publication, No. 2010, "Silver, Engineering Properties and Uses," has been issued by Johnson Matthey and Co., Ltd., of 73-83 Hatton Garden, E.C.1. In addition to listing the physical, chemical and optical properties of silver, it gives particulars of the grades available, the principal alloys, and the forms in which silver can be supplied. There is also interesting basic information on applications of silver in the electrical and electronic industries; in chemical engineering for liners and as a catalyst; and in low-temperature brazing.

METAL TREATMENT.—Latest issue of the "Bonderizer," a News Letter issued by the Pyrene Co., Ltd., Metal Finishing Division, Great West Road, Brentford, Middlesex, features an article on the manufacture of Frigidaire refrigerators.

TIN-NICKEL PLATING.—Full particulars of tin-nickel electro-plated coatings are given in a publication recently issued by the Tin Research Institute of Greenford, Middlesex. Tin-nickel alloy is a new development which has a remarkable resistance to corrosion, remaining permanently bright when exposed to the atmosphere or to many liquids and sprays which rapidly corrode other deposits. A considerable future is envisaged not only for decoration purposes but for such applications as chemical plants.

GAS TURBINE ALLOYS.—From the Mond Nickel Co., Ltd., of Sunderland House, Curzon St., W.1, comes a revised edition of their publication: "The Nimonic Alloys—Their Application to Gas Turbine Design," giving physical properties and creep data of the entire series of these alloys.

NEW LITERATURE

Basic Electrotechnics

by B. L. Goodlet, O.B.E., M.A., M.I.C.E., M.I.E.E.

FOR an intelligent understanding of the many facts that he has to absorb, the engineering degree student needs a fair understanding of electrical and magnetic theory. Yet if he is to get it by treading the normal paths, he may find his mathematical appreciation, if not technique, rather strained, and feel that the results obtained are rather far removed from the problems he meets. This thought has been well appreciated by the author of the present volume, who has consciously "thrown overboard the classical approach." A price is paid in mathematical rigidity (a fact unlikely to worry most engineers) and in smoothness of development, but undoubtably the attempt is worth while, and there will be many who are greatly assisted by it.

From the reader, a general knowledge of physics and of elementary calculus is expected. Units are dealt with at the beginning of the book, after which the rationalised M.K.S. system is used. After steady current phenomena have been dealt with, electrostatic theory is treated, with some interesting closing notes on dielectric strength. Electromagnetism comes next, with magnetic circuit calculations following, then alternating current circuits and some machine fundamentals. A final chapter covers Maxwell's equations and electromagnetic waves. One criticism of the method adopted is that it introduces considerable variation of difficulty from page to page; but to counter this, optional reading is carefully indicated. Published by Edward Arnold, 247 pages, 8½ in. by 5½ in. Price 21s.

Electronic Applications

by H. A. Miller, A.M.I.E.E.

THERE is no shortage of books on electronics and a special line of attack must be found to justify any addition to the list. In Mr. Miller's case, the approach is through detail for those already having a basic technical knowledge; a "popular" book for the engineer whose main interests are in another field. Particular subjects treated are valves, motor control, counting and testing; temperature and photo-electric control, telecommunication techniques, and electronics in medicine. For all these topics there is a collection of interesting, if somewhat disconnected, facts to interest the reader. Published by E. and F. N. Spon, 110 pages, 8½ in. by 5½ in. Price 18s.

Transients in Electric Circuits

by W. B. Coulthard, B.SC. (ENG.), A.M.I.E.E.

HEAVISIDE operational calculus is the basis of this volume, and the first chapter is devoted to the general theory of this mathematical method. Each of the following eleven chapters is devoted to some topic of electrical interest which can be analytically treated by Heaviside techniques. Lumped circuits are the subject for the first half of the work, while the second half deals with circuits having distributed parameters, and touches on such matters as wave propogation along a line, voltage and current build up, and eddy current effects. Fourier series and integrals, together with Luplacian transforms are the subject of a further chapter, while the two final chapters on circuits with variable parameters include an introduction to Bessel functions. This is the second edition of a work which is of the greatest assistance to engineers who have to deal quantitatively with varying phenomena, and the opportunity has been taken of introducing a considerable amount of new material. Published by Pitman, 260 pages, 8½ in. by 5½ in. Price 32s. 6d.

BOOKS RECEIVED

Filing and Indexing, by O. Standingford. Brief review of available systems. Published by Office Management Association, Management House, 8 Hill Street, W.1, 36 pages, 9¾ in. by 6 in. Price 5s.

The Measurement and Control of Temperatures in Industry, by R. Royds. Covers all types of instrument, including theory and much practical information. Published by Constable, 260 pages, 8½ in. by 5½ in. Price 25s.

Synchronous Machines, by C. Concordia. Theoretical study of performance, largely mathematical. Published by Chapman & Hall, 224 pages, 9 in. by 6 in. Price 44s.

Electroplating, by S. Field and A. D. Weill Practical survey of modern practice, including analysis of solution. Published by Pitman, 546 pages, 7¼ in. by 4¾ in. Sixth edition, price 20s.

Industrial High Vacuum, by J. R. Davy. Design and manipulation of installations, and application to industrial purposes. Published by Pitman, 243 pages, 8½ in. by 5½ in. Price 25s.

Industrial Administration and Management, by F. L. Meyenberg. Textbook for Engineering Institution examinations. Published by Pitman, 387 pages, 8½ in. by 5½ in. Price 35s.

Principles of Alternating Currents, by W. Sluckin. Basic theory of alternating current work for Intermediate C. and G. syllabus. Published by Cleaver-Hume Press, 320 pages, 7¼ by 4¾ in. Price 10s. 6d.

Manual for the Illuminating Engineer on Large-scale Perfect Diffusers, by H. Zijl. Mathematical monograph from Philip's laboratories. Published by Cleaver-Hume Press, 270 pages, 9 by 6 in. Price 30s.

Patents, Designs and Trade Marks, by C. S. Parsons. Edition of 1938 with supplement on changes under the 1949 Acts. Published by The Technical Press, Ltd., 184 pages, 8½ by 5¼ in. Price 14s.

Electric Lighting, by C. E. Gimson. General principles, with notes on available lamps, etc., primarily for the contractor. Published by Cleaver-Hume Press, 224 pages, 7¼ by 4¾ in. Price 9s. 6d.

THE WEEK

COMMERCE *in news* INDUSTRY

Keep Hydro Board Separate

MENTIONING references to an alleged intention of the new Government to create one Electricity Board for Scotland, Mr. T. Johnston, chairman of N. of Scotland Hydro-Electric Board, said in Dundee last week, that such an amalgamation would spell disaster. The Board should continue to be a separate entity for at least 10 years, he said, as only confusion and frustration would arise from its fusion with coal generation in the south. In the large corporation, the dominant interests would be the coal-fired stations and industrial organisations south of the Tay, and Highland interests consequently would be submerged in the greater pulls of the south.

Street Lighting Responsibilities

A CIRCULAR has been sent out by the Minister of Transport to remind local lighting authorities of their responsibilities in regard to street lighting. Some concern is expressed over the relations between those authorities and Area Gas and Electricity Boards. It is pointed out that new schemes which come under Defence Regulation 56A must be authorised by the Ministry. The Area Boards have no power to give that permission and contractors offering to undertake the whole responsibility of the installation are acting without authority. Lighting authorities when deciding on a new scheme, are recommended to purchase the necessary equipment and not enter into a contract for its hire on a rental basis.

More Wage Increases

TWO more wage increases are announced. Plumber-jointers are to get a rise of 3¼d. per hour, with consequential increases for mates and boys, as from the third pay day in November. For plumber-jointers, the increase brings the rate up to 3s. 8¼d. per hour in the London area and 3s. 4¼d. elsewhere. For mates, the new rates will be 3s. 1¾d. in the London area and 2s. 10¾d. outside.

The other increase is for all adult workers in the cable-making industry, also applying from the third pay day in November. In this, the pay for men (21 and over) will be increased by 10s. 1d. per week for a 44-hour week, and 8s. 3d. for adult females (18 and over). There are proportionate rises for younger employees of both sexes.

Closing a Loophole

IT IS expected that a new Order will be issued shortly by the Ministry of Supply, fixing the basis for prices of secondary copper ingots. This is aimed at closing existing loopholes whereby official prices in the non-ferrous trade are being evaded. Such regulations were not considered necessary when the Metal Orders were framed, as most of the metal went direct into brass and other alloy ingots. The omission, however, provided a loophole for the unscrupulous few. Although not bound to do so, the trade is already abiding by a scheme negotiated between the Ministry and trade associations. The price of secondary copper ingots now stands officially at £225 a ton.

S.W. Scotland's Warning System

THE S.W. Scotland Electricity Board have given some details of their special shortwave wireless system to give warnings of load shedding. These will supplement the warnings to be broadcast by the B.B.C. in the Light Programme, referred to in our October 4 issue. The supplementary messages will be transmitted to a number of industrial consumers who have received V.H.F. radio receivers on loan from the Board. Only 58 of these will be in operation this winter due to the difficulties which have arisen in obtaining delivery of the sets.

Conference of Housecraft Advisers

THE next annual Conference of Electrical Housecraft Advisers and Senior Demonstrators which is organised jointly by E.D.A. and E.A.W. will take place in London between January 29 and February 1 next year. The first two days of the conference will be at Royal Empire Society's Hall, Northumberland Avenue, when the programme includes a talk on "Electricity Comes To Scottish Crofters," by Mrs. M. E. C. Stewart, on Tuesday, and "Demonstration is an Art," by Ena M. Eaves, on Wednesday. Thursday morning is to be spent at the Hotel and Catering Exhibition and the final day's session will be at the Connaught Rooms.

The First Half-Century

Mr. Hammond presided at the very pleasant dinner given by himself, the architects and the contractors in the Grand Hall of the Hotel Cecil following the opening of the Hackney Municipal Electricity Works. The glow-lamp flowers in the buttonholes of the committee began toward the end of the evening to pale their ineffectual fires, telling of exhausted batteries.
From our issue of November 7, 1901.

General view of the fluorescent scheme in Liverpool's Walker Art Gallery. Note that the room, other than the actual pictures, is illuminated entirely by indirect light

Delegates may also care to bear in mind that Miss K. E. Piatt will be giving the seventh Dame Caroline Haslett Trust lecture at the I.E.E. on the evening of the conference's first day.

Henley's try History

ONCE again this year, the annual conversazione held on Saturday in connection with the education scheme of W. T. Henley's Telegraph Works Co., Ltd., was marked by the popular spectacle of Sir Montague Hughman, chairman of the Henley Organisation, presenting prizes to those members of the scheme who had achieved examination successes during the year. In other respects, however, there were many changes from previous years. The principal speaker at this ninth conversazione was Mr. Rubeigh Minney, author, playwright and producer, who substituted interesting stories of personalities he had met for the good advice sometimes offered on these occasions. Later on in the day, appropriately enough, "A Saga of Scientific Discovery," a series of sketches tracing the advance of science, was presented by Henley employees and others. The author of this successful new venture was Mr. F. Davis, of Henley's Research Laboratories. The exhibition which accompanied the other events also struck a new line this year, with emphasis on the arts connected with printing.

Recruitment into Welsh Industry

REPRESENTATIVES of various sections of Welsh industry and appropriate Government departments met at Shrewsbury recently to discuss the problem of recruitment into industry from grammar schools. Among the delegates were officials of the S. Wales and Merseyside and N. Wales Electricity Boards. For nearly 60 years most of the best pupils from the schools had entered the "black-coated" professions, at the expense of industry. Since 1935, delegates were reminded, Wales had been transformed industrially—a large variety of firms producing promising educational schemes. It was important that a fair proportion of the brighter students should be trained for Welsh industry. The conference agreed that there should be increased contact between works managers and headmasters, with this object in view.

Henley's director, Dr. P. Dunsheath, examines a starter pistol made by student N. Cherry at the company's conversazione last weekend. Watching is Mr. S. E. Goodall, of Henley Education Committee

Fluorescent Scheme in Art Gallery

THE Walker Art Gallery, Liverpool, was reopened to the public a short while ago following its wartime requisition by the Ministry of Food and subsequent restoration. Part of the Gallery's rehabilitation took the form of a new and up-to-date lighting system, in which it was decided to use fluorescent lamps. Fittings were specially designed by the G.E.C. and were made of sheet steel with a reflector which allows some light to pass on to the upper walls thus softening the cut-off shadow.

Colour-matching lamps were found to be most appropriate and each reflector accommodates one such lamp, the whole installation comprising 206 fittings with 5 ft lamps, six with 4 ft lamps and 14 with 3 ft lamps. The electrical installation was carried out by the city lighting department.

"Saucepan Special"

A SMALL radio receiver known as the "Saucepan Special" made in this country at low cost for the African people of Northern Rhodesia has led to a greatly increased interest in broadcasting in that country, according to a Unesco report on "Low Cost Radio Reception," published last week by H.M.S.O., price 4s. The report is one of a series of Unesco studies of the role of radio in education and has been written by M. Claude Mercier of Radiodiffusion Francaise.

Mobile T.V. Stations

TWO specially designed television stations on wheels are now ready for shipment to Canada from Marconi Wireless Telegraph Co., Ltd. These vehicles constitute a part of a large contract to provide a complete television system for Canada, which was awarded to the company some months ago. Each is a self-contained three-camera station with its own production and transmission equipment. It will be possible to drive one to any place within micro-wave range of the main station (or farther if using intermediate re-transmission points) and be on the air within 45 minutes. External connection to mains and telephone can be eliminated by using a trailer generator power supply and micro-wave sound channel for telephone lines. Mains voltages from 90 V to 240 V can be used.

E.C.A. Information

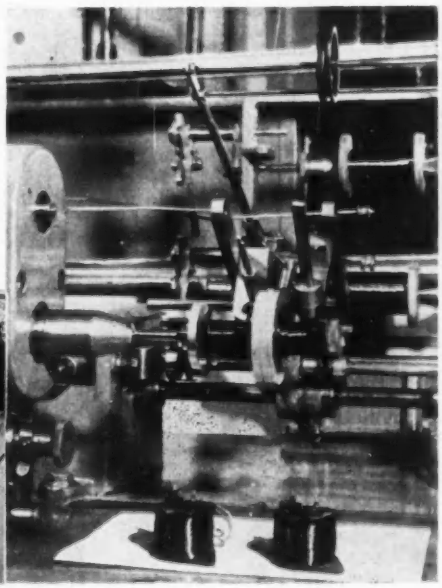
PHOTOGRAPHS recently received from the Economic Co-operation Administration illustrate methods of increasing production at the Vienna instrument works of Martin Behringer. Amongst them are the conversion of a single unit coil winder to wind two coils simultaneously, and an improved scale-marking machine which is capable of drawing an instrument dial in 8-10 minutes—approximately one-third of the previous time.

Mechanisation in Track Repairs

LAST week, at London's Marylebone (E.R.) goods depot, British Railways staged an interesting display and demonstration of mechanical and electrical equipment for speeding the maintenance and repair of railway track and permanent way.

About 40 different machines were on show, they ranged from a knapsack sprayer for weed killer to a giant track relaying unit which comprises three trucks complete with its own power plant. Interesting items were the electric drills, saws and planes made by well known British manufacturers, the specially designed rail drills and saws, wood sleeper borers and the power wrench which were made by a Swiss machinery firm and the electric ballast-tampers and electric hedge trimmer. The displays and demonstrations were backed up by film shows in a special Southern Region cinema coach complete with its own independent diesel generator truck.

Machines at the Vienna instrument works of Martin Behringer. Below, the scale-marking machine and, right, the single-unit coil winder



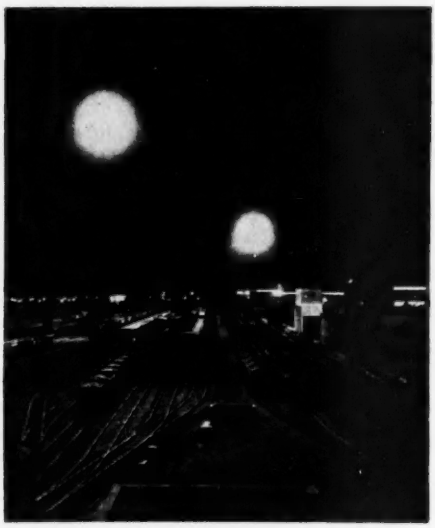
1952 Summer School on Welding

IN VIEW of the successful summer school on welding design and engineering organised by the British Welding Research Association at Ashorne Hill, near Leamington Spa, the project is to be repeated next summer between July 16 and 25. Next year's course will, however, be divided into two parts, one for those concerned only with the practical aspects of welding, which will be between July 16 and 20, and the second for those interested in design, inspection and manufacturing problems. The latter is to take place from July 20 to 25. Further details will be given by the Association later.

Disabled pass out as Electricians

REHABILITATION was hardly known as it is today at the turn of the century when Sir William Treloar was at the beginning of his work for the disabled, crippled and impoverished. His name will never be forgotten, particularly as his zeal has been inherited by his daughter, who last week formally opened Treloar House for boys and girls between 14 and 18 at Queen Elizabeth's Training College for the Disabled, Leatherhead.

The electrical industry will be particularly interested to learn that between 14 and 20 electricians pass out into normal jobs each year from the



A night-time view of part of the sidings at Abbey Works of the Steel Company of Wales showing two of the 150 ft towers and the illumination they provide

college. At present there are eight men taking the special 26-weeks' course which will fit them as garage engineers, electricians' mates, or for work in the maintenance or repair of motors, switchgear and domestic appliances. In charge in the electrical workshops is Mr. W. R. Wattle, ex-army officer in the Royal Signals now in his sixth year at the college. He said reports of some of his past pupils showed that they were often better workers than the able-bodied. He had had a request that day from a firm asking for a second man from the college for that very reason.

Students study Earley

FOR their second meeting of the present session, members of the London Students' Section of the I.E.E. had a B.E.A. Southern Division station as their main interest. The authors of the paper read, Messrs. M. G. Nash, Grad.I.E.E., and J. E. G. Silvester, B.Sc.(Eng.), Grad.I.E.E., entitled their joint contribution "Power Station Practice, with Particular Reference to Earley Power Station." After a brief historical review of boiler and turbine development, they dealt successively with the boiler plant, turbines, electrical plant and protective equipment of a modern power station, in each case with special reference to the installation at Earley. Particular attention was given to the factors determining the choice of plant for this station, and to the modifications which proved necessary in operation.

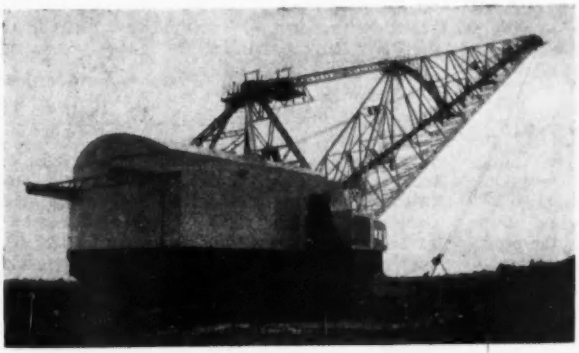
Railway Sidings Floodlit

THE presence of tall buildings was a determining factor in the design of a lighting scheme in the private sidings serving the Abbey works of the Steel Company of Wales. To overcome this difficulty on that site, seven 150 ft towers were erected, on which groups of 1,000 W and 500 W floodlights were mounted. The whole scheme comprises a total of 155 lamps, 123 being of the former wattage and the remainder of 500 W. It will be noticed from our accompanying illustration that the mounting height prevents shadows being cast by the buildings, and, of course, there is less obstruction between the tracks than with more usual installations. Another advantage which this scheme has over others is the convenient access to a number of fittings at the same time—one ascent takes the engineer to some 20 fittings. Equipment for this installation was supplied by the General Electric Co.

Lord Ismay with Batti-Wallahs

FULFILLING an engagement undertaken some while before his appointment as Secretary of State for Commonwealth Relations, Lord Ismay addressed a large gathering of Batti-Wallahs and their guests at the monthly luncheon held last week at the Connaught Rooms, Great Queen Street. His talk was necessarily shortened by his being one of the Lord's Commissioners who sat to order the election of a Speaker that same afternoon, but

Can serious interruptions to power supply this winter be avoided? That is the dominant question in Sydney, New South Wales, these days, where serious shortages of labour and material have delayed completion of extensions to the County Council's Bunnerong and Pyrmont generating stations. At Bunnerong, where a 50 MW unit is expected to be running by mid-winter, progress is now well advanced, as our latest photograph, reproduced alongside, shows. At Pyrmont, the first 50 MW high-pressure set should be operating by next March



This mammoth walking dragline, believed to be the world's largest, is seen in operation in Stewart's and Lloyds' quarries at Corby, Northants. Weighing 1,600 tons, it took Ransomes and Rapiers Ltd. nearly four years to build. A fair idea of its size may be gained from the men at the foot of the machine. Details of the electrical equipment installed will be given in our next issue

in the time at his disposal he interested all present with first hand accounts of some outstanding occasions during the war years when he was Chief of Staff to Mr. Churchill.

Immersion Heaters

OUR attention has been drawn to one or two errors occurring in the tabulation of immersion heaters in our issue of Sept. 13. The side entry circulator manufactured by Duncan Low Ltd. in 2 kW rating should be priced at £7 7s. and not £7 17s. Also their top entry circulator listed at £10 11s. should read 42 in. length not 24 in. as stated. The price given for a 3 kW 10 in. Santon immersion heater of £6 11s. 6d. should read £6 1s. 6d. Finally, the registered office for Creda water heaters should be at Blythe Bridge, Staffordshire, not at the Simplex address of Oldbury, Birmingham. We regret any inconvenience caused.

B.E.A. First-Aid Competition

IN the second annual First Aid Competition of the British Electricity Ambulance Centre, at Porchester Hall, London, on Tuesday, the South Eastern area (Worthing) carried off the championship and Blessed Gerard trophy in the Men's Section, and the South Eastern area (Sussex) the women's championship and the Florence Nightingale trophy. Winners in each section will represent the centre in the Grand Prior's Trophies Competition of St. John Ambulance Association on November 20.

NEWS IN BRIEF

The Nevelin Electric Co., Ltd., is to provide two 250 kW glass bulb mercury arc rectifiers for the Palace of Westminster, to provide d.c. supplies to the Houses of Parliament.

The last of three 2,700-ton colliers ordered by the B.E.A., the *Hackney*, is to be launched at Sunderland next Wednesday.

Oldham and Sons, Ltd., entertained some 350 agents and distributors to a dinner at the Park Lane Hotel during the Motor Show. The Western Brothers topped the bill in a cabaret.

Extended hours of opening of the Patent Office Library in Chancery Lane, W.C.2, will continue until December 28. Hours are from 10 a.m. to 9 p.m. Mondays to Fridays and 10 a.m. to 5 p.m. on Saturdays.

Two hundred members and guests were present at the annual dinner of Micanite and Insulators Co. Ltd.'s Long Service Association.

Wolseley's Electric Fencer has won the silver medal, class 96, at the Dairy Show. The award is made for any new apparatus or invention for the agricultural industry, or one showing improvement especially as a save in labour. Makers are Wolseley Sheep Shearing Machine Co., Ltd.

An N.C.B. mobile self-service shop made by Smith's Electric Vehicles Ltd. won a silver medal at this year's Dairy Show.

Following a very successful season, Revo Electric Co. Ltd.'s band is now busily rehearsing for a radio programme to be broadcast next Tuesday, at 6.30 p.m.

Annual meeting and luncheon of E.I.B.A.'s Birmingham Branch will take place on November 30. Tickets are 12s. 6d. each and obtainable from hon. secretary, Mr. L. Wall, Electrical Components Ltd., 102 Snow Hill, Birmingham 4.

"National Association for Prevention of Tuberculosis has published "Home Work with a Difference," price 10s. 6d.

About 950 serving and retired members of the Metrovick Long Service Association attended their annual social gathering at the Trafford Park works recently. Picture shows Sir George E. Bailey, company chairman and president of the association, greeting the ladies. With him is the association's chairman, Mr. H. Annis

Electric Supply News

Bristol

To make itself independent of supplies from the South Western Electricity Board, the Bristol Aeroplane Co.—the area's largest consumer—has purchased six diesel generators designed for use in submarines, and plans to have its own power station by next winter. Installation of the necessary plant has already started.

Eire

The first 22,500 kW turbine at the Cathaleen Falls station, Ballyshannon, of the Electricity Supply Board, is expected to have its first tests before the end of this month, and the second similar set should follow about next March.

The manner in which the shortage of other fuels has impinged on the supply of electricity and led to rationing by the Electricity Supply board, was outlined by Mr. R. F. Browne, chairman of the Board, at a meeting of the Dublin Chamber of Commerce recently. After he had referred to prospects of atomic energy generation, of hydro-electric power, and the Board's bog development, one member suggested that the Government could have bought a coal-mine in Britain and thus ensured a supply. Mr. Browne said that the Board had discussed the possibility of generating electric power in Scotland by that method and bringing the current by cable through Northern Ireland.

Glasgow

On the completion of extensions to the Corporation's Pinkston power station, it should be possible to supply surplus electricity to the grid system, Mr. E. R. L. Fitzpayne, general manager of the Transport Department, stated recently. (Pinkston power station supplies the Corporation's transport undertaking.)

Lakeland

The North Western Electricity Board has turned down a request for underground cables to supply farmers at Hartsop, between Ullswater and Brotherswater, Lake District. As this is a National Park area, overhead lines are banned. The Board has stated that the cost of underground cables, which would be two and a half times that for o.h. lines, is the reason for refusing this request.

N. Wales

Further opposition to the B.E.A.'s proposed hydro-electric schemes in North Wales was voiced on Saturday last by Mr. J. F. W. Rathbone, secretary of the National Trust, after he had completed a tour of areas involved in the Conway and Mawddach schemes. The Conway scheme was particularly serious, he said, because it affected 26,000 acres of the Penrhyn Estate which had just been acquired by the Trust from the Treasury. He was bringing the whole question of the schemes before the executive committee of the Trust this month. He hoped that he might be able to persuade the B.E.A. to abandon that part of the Mawddach scheme, which would draw water from the River Camlan, thus preserving the spectacular popular Rhayadr Du waterfalls.

S.W. Scotland

Although November and December have been mentioned as "critical months" for Scotland's power supplies, officials of the South-West Scotland Division of the B.E.A. are optimistic that cuts may not be so severe this winter as they were a year ago. Their optimism is based on the fact that because of new plant they are now in a stronger position to avoid load-shedding. The first 50,000 kW generator is running at the new station at Braehead on the south bank of the Clyde near Renfrew, and by the end of the year another 50 MW set should be in operation. A new 30,000 kW generator is in service at Clyde's Mill, and by the middle of this month another of the same capacity will also be operating. In addition arrangements have been made to obtain, during certain parts of the winter, 185,000 kW instead of 100,000 kW from the North of Scotland Hydro-Electric Board. Scottish supplies this winter will also be augmented by a 60,000 kW generator which is expected to come into use soon at Portobello.

LIGHTING SCHEMES

Blackpool. The T.C. has agreed that £74,750 should be spent on illuminations next year—£10,608 more than in 1951.

Coventry. The Road Safety Committee recommends the expenditure of £8,750 for street lighting at Hearsall Lane, Hearsall Common; Tile Hill Lane and Fletchamstead Highway.

Gateshead. M.o.T. has approved in principle Stage 3 of the T.C.'s street lighting electrification scheme, at a cost of over £26,000.

Market Harborough. The U.D.C. propose to spend £7,760 on improvement of lighting on main roads.

Nuneaton. M.o.T. representatives have indicated that they are prepared to agree tentatively to a certain amount of fluorescent street lighting in the town and sodium lighting on some lengths of main roads.

Oldham. The Finance Committee has decided to change the lighting of Oxford Street from gas to the electric sodium system. Block Lane, which is a continuation of Oxford Street, and is in Chaderton, is to be similarly lighted.

Oswaldtwistle. U.D.C. is asking the M.o.T. to discuss the immediate conversion of lighting along Blackburn Road from gas to electricity.

Radcliffe. T.C. has received consent to borrow £3,380 for improved street lighting on Ainsworth Road, Spring Lane and Cross Lane.

Stone (Kent). A plan has been prepared for converting street lighting to electricity.

Swadlincote. Following the M.o.T. proposals for modification of Stage 3 of the street lighting scheme, the Highways Committee is to again discuss the matter with the divisional road engineer.

Company Activities

Aerialite Ltd.

For the year ended May 31 last, consolidated trading profit amounted to £182,018 as compared with £144,569 in the previous year. Depreciation absorbs £16,755 (*£13,663*), directors' and auditors' remuneration £17,073 (*£14,040*), and taxation £80,642 (*£56,844*), leaving net profit of £67,548 (*£60,022*), of which £60,503 (*£58,046*) is attributable to Aerialite. Transfer to Preference redemption £650 (*£623*), to general reserve £1,805 (*nil*), dividends totalling 88⅓% (*112½% of which 62½% was on old capital*), and there is £107,668 carried forward.

Burco Ltd.

After charging taxation of £75,969 (*£62,001*), the profit for the year ended September 30 last was £60,475 as compared with £62,806 for the previous twelve months. The final dividend is 28¾% (*25% plus bonus 7½%*), making a total of 38¾% (*42½%*).

Electric and Musical Industries

Consolidated net profit of the company and its subsidiaries in England and British overseas territories, including dividends from foreign subsidiaries, for the year to June 30 last, was £663,000, compared with £324,809 in the previous period. The trading profit includes non-recurring items and items relating to previous periods amounting to £90,000 (*£160,000*). The consolidated net profit is struck after providing £959,000 (*£201,499*) for taxation. The sum of £450,000 (*£175,000*) has been appropriated out of the group profits to the general reserves of subsidiary companies, along with a surplus of £700,000 arising from a settlement with Inland Revenue, etc., net profit of the present company is £202,703 (*£145,750*).

Perak River Hydro Electric Co.

Profit for the year to July 31 last, after charging depreciation of £107,150, is £568,004. With £84,863 brought in there is £652,867 (*£531,094*) available. To taxation £350,000 (*£260,000*), debenture sinking fund £92,850 (*£88,425*), debenture interest £10,953 (*£24,342*), fuel equalisation reserve £50,000 (*£40,000*). Arrears of the 5% Preference dividend for 1941-42 to 1943-44 will be paid on December 1 next, requiring £98,438, leaving a balance of £100,626.

Parmiter Hope & Sugden

The directors propose a bonus issue of two new 1/- Ordinary shares for every five Ordinary shares held.

Scophony-Baird Ltd.

The year to March 31 resulted in a trading loss of £55,883 (*loss £47,802*). After deducting depreciation £2,271 (*£6,900*) and all expenses, etc., the net loss is £142,864 (*loss £80,100*). The net loss is struck after writing down certain of the company's assets and providing for various claims against the company. The directors state that in the first six months of the current year a small trading profit was earned.

Rawlings Brothers

For the year to March 31 last, the group net trading profit amounted to £33,197 (*£40,627*), which was increased with other income, to £43,452 (*£50,753*). To depreciation £2,906 (*£2,532*), interest payable £1,078 (*£1,042*), and after allowing other charges, the net profit is £5,806 (*£13,283*). The Ordinary dividend is 7½% (*same*), and after transferring £2,000 (*£3,000*) to employers' benevolent and retirement reserve, there is £38,160 (*£38,728*) carried forward.

Dividends Declared

British Xylonite, Ltd.—Interim dividend of 5% (*same*).

Broadcast Relay Service.—Interim dividend of 8% tax free.

Clear Hooters, Ltd.—Final dividend of 12½%, making 20% (*same*).

Hackbridge and Hewittic Electric Co.—Interim dividend of 5% (*same*).

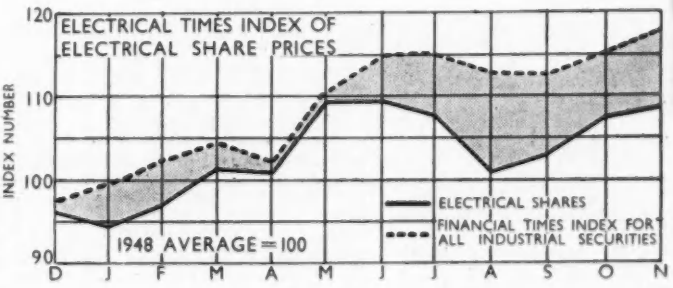
Herbert Morris, Ltd.—Final Ordinary dividend of 15% plus bonus 5% (*both same*), again making 25%.

Revo Electric Co.—Interim dividend of 5% (*same*).

Wallis Tin Stamping Co.—Final dividend of 41⅔% again making 66⅔%.

G. and J. Weir, Ltd.—Interim dividend of 10% (*same*) payable on November 28.

Share prices continued their upward trend during October. At the end of the month the "Financial Times" index for all industrial shares rose from **115·3** *to* **117·6**. *The increase in the "Electrical Times" figure for electrical shares was not as appreciable, rising by* **1·1** *to* **108·6**. *The figures are based on average prices during* **1948**



Commercial Information

CONTRACTS OPEN

HOME

Nov. 12.—Radcliffe T.C. Installation of electricity in 38 houses, 12 flats and 14 bungalows in Wordsworth Avenue. Borough Engineer and Surveyor, Town Hall. Deposit £1 1s.

Nov. 12.—Rhondda U.D.C. Installation of electricity in 150 houses at Maerdy. Council's Housing Architect, 13 Ystrad Rd., Pentre.

Nov. 12.—Ryton-on-Tees U.D.C. Installation of electricity in 92 houses in Chester Gardens. Surveyor, Council Offices, Ryton Tower, Ryton.

Nov. 12.—Shepshed (Leics) U.D.C. Electrical wiring of 96 houses. H. W. Beresford, Clerk, Council Offices. Deposit £2 2s.

Nov. 12.—Southport T.C. Electrical installation in extension to Technical College. Architects, Cruickshank and Seward, 16 Princess St., Manchester 1.

Nov. 13. — Ince-in-Makerfield U.D.C. Electrical installations in 40 houses on Battersby St. site. Surveyor, R. Lewis, Town Hall, Ince, Nr. Wigan. Deposit £1 1s.

Nov. 14.—N. Ireland. Electric lamps and other requisites are included among supplies required by Lagan Valley and Lisburn Hospitals during year beginning Jan. 1, 1952. Secretary, S. Antrim Hospital Management Committee, Dublin Rd., Lisburn.

Nov. 15.—Ashford (Kent) U.D.C. Erection of 32 class B concrete street lighting columns and lanterns. Surveyor, 5 North St. Deposit £1 1s.

Nov. 15.—Ellesmere Port (Cheshire) U.D.C. Supply and erection of 54 sodium discharge lamps along trunk road A.41 at Little Sutton. Engineer and Surveyor, Council Offices. Deposit £2 2s.

Nov. 15.—Manchester. Electrical installation at Hall Lane police station. Wythenshawe. City Architect, Town Hall. Deposit £1 1s.

Nov. 15.—Stockport T.C. Erection of 100 concrete lighting columns and supply of 100 time switches. Chairman of General Purposes Committee, c/o Burough Surveyor, Town Hall.

Nov. 15.—Sunderland T.C. Electrical work in Thorney Close junior and infant schools. Borough Architect is H. C. Bishop, Stockton Rd. Deposit £2 2s.

Nov. 16.—Sowerby Bridge U.D.C. New electrical fittings and rewiring of public library. Engineer and Surveyor, Beech Royd. Deposit £2 2s.

Nov. 16.—West Hartlepool T.C. Electrical installation in old people's hostel in Station Lane. Borough Architect, Municipal Buildings.

Nov. 17.—Invergordon. Electrical work at Invergordon I.D. Hospital. Architect, Northern Regional Hospital Board (Scotland), Raigmore Hospital, Inverness.

Nov. 17.—Windsor T.C. Supply of electric lamps, fittings and cable during year ending Dec. 31, 1952. G. S. Baker, Borough Engineer, Kipling Memorial Building, Alma Rd.

Nov. 17.—Worsley U.D.C. Electrical work in Town's Yard reconstruction. Engineer and Surveyor, Town Hall, Walkden. Deposit £2 2s.

Nov. 19.—Finaghy (Belfast). Electrical work in 20 dwellings at Locksley Park. N. Ireland Housing Trust, 12 Hope St., Belfast. Deposit 10s.

Nov. 19.—Southport T.C. Tenders invited for (a) supply and laying of approx. 1,150 yd of cable suitable for 39 kW on 3-phase neutral system for pier illuminations, with fuses, tapping points, etc., or (b) supply of cable. Particulars from Publicity and Attractions Dept., Town Hall. (See November 1 issue.)

Nov. 19.—Stockton-on-Tees T.C. Lighting installation in Roseworth infants' school. T. C. Hartley, Borough Architect, 28 The Square, Deposit £1 1s.

Nov. 21. — Formby (Lancs) U.D.C. Supply of concrete street lamp columns required during year ending Dec. 31, 1952. Engineer and Surveyor, Council Offices.

Nov. 21.—Manchester. Supply of Group B top entry street lighting lanterns during year ending Dec. 31, 1952. Applications to City Surveyor, Town Hall.

Nov. 23.—Belfast. Supply and erection of (a) two 48 in. bore and two 72 in. bore motor operated sluice valves for condenser circulating water culverts; and (b) seven penstocks 5 ft by 10 ft, three 3 ft by 13 ft and one 6 ft by 13 ft motor operated with emergency hand operating gear. Also one road transport weighbridge capable of weighing up to 30 tons and with indicating and ticket printing recording equipment. All for Electricity Dept. Merz ard McLellan, consulting engineers, Carliol House, Newcastle-on-Tyne. Deposit £5 5s. (See October 25 issue.)

Nov. 24.—Glyncorrwg U.D.C. Wiring of 86 houses at Cymmer. Engineer and Surveyor, T. J. Walker, Council Offices, Cymmer. Deposit £1 1s.

Nov. 24.—Lewisham. Supply of 50 columns for street lighting on Group A roads. Borough Engineer, Lewisham Town Hall, Catford, S.E.6.

Nov. 26.—Dewsbury T.C. Electrical installation in Bank Top secondary school. Borough Architect and Buildings Surveyor, Town Hall. Deposit £3.

Nov. 26.—N. Ireland. Electrical work on 166 houses at Hilden for N. Ireland Housing Trust, Trust Offices, 12 Hope Street, Belfast. Deposit 10s.

Nov. 28.—Hertfordshire. Maintenance of refrigerators, etc., in schools. Apply to Central Purchasing Officer, The Old Rectory, Hatfield.

Nov. 28.—Folkestone T.C. Internal wiring of 20 flats at Biggins Wood site (Contract No. 7). Applications to Borough Engineer, Municipal Offices, West Terrace, by Nov. 13. Deposit £1 1s.

Dec. 1.—Hinckley (Leics) U.D.C. Supply and installation of (*a*) 180 concrete columns and (*b*) same number of lanterns, chokes, capacitors, all in Group A. Lighting Engineer, H. M. Etherington, 9 Station Road. Deposit £2 2s. (Advertised in this issue.)

Dec. 7.—Belfast. Supply and erection of low pressure piping

installation, including valves, auxiliary pumps, tanks, water softening plant, air compressor and associated equipment. Merz and McLellan, Consulting Engineers, Carliol House, Newcastle-on-Tyne. Deposit £5 5s. (See October 18 issue.)

Dec. 12.—Monmouthshire. Eastern Valleys joint sewerage board invites tenders for eight sets of electrically driven vertical pumps with ancillary equipment. John Taylor and Sons, Artillery House, Westminster, S.W.1. Deposit £5.

Dec. 17.—Darlington. Provision and erection of two electric motor and centrifugal pump sets, automatically controlled. Council's Consulting Engineer, Arnold Brooksbank, 14 The Exchange, Bradford. Deposit £2 2s.

Dec. 17.—Rugby T.C. Four sets of electrically driven vertical propeller pumps and two electrically driven vertical sludge pumps and ancillary equipment. Engineers, John Taylor and Sons Artillery House, Victoria St., S.W.1. Deposit £5.

Jan. 4, 1952.—Belfast. Supply and erection of complete coal-handling plant for Victoria power station, including reclaiming transporter, conveyors, automatic weighers and all ancillary equipment. Merz and McLellan, consulting engineers, Carliol House, Newcastle-on-Tyne. Deposit £5 5s. (Advertised in this issue.)

Feb. 1, 1952.—Ireland. Supply and erection of hydro-electric generating plant at Inniscarra and Carrigadroid stations on River Lee. Documents from Chief Generation Engineer, Electricity Supply Board, 27 Lower Fitzwilliam St., Dublin C.18. Deposit £5 5s. (See November 1 issue.)

No date stated.—Aberdeen. Electrical work in reconstruction of Hanover St. primary school. J. A. O. Allan, Ross and Allan, Architects, 10 Bon-Accord Sq.

OVERSEAS

*Details of items marked * may be obtained on application to Room 1076, Board of Trade, Thames House, North Millbank, S.W.1, quoting reference.*

Nov. 23.—S. Rhodesia. Tenders invited by Municipality of Que Que for supply of distribution transformers. Consulting Engineers, Brian Colquhoun and Partners, 622 Rhodelect House, Salisbury. Deposit £2 2s.

Dec. 3.—India. Supply of telephone equipment for Jog-Karnatak electric grid system. Electric Grid Dept., Transmission Section, Govt. of Bombay. B.o.T. (Ref. CRE (IB) 74013/51).*

Dec. 6.—South Africa. Port Elizabeth City and Water Engineer invites tenders for (a) four complete diesel or electrically-driven pumping units for proposed Gamtoos pumping station; and (b) three complete sets of electrically-driven pumping equipment for proposed Sea View station. Separate contracts. B.o.T. (Refs. CRE (IB) 73824/51, and CRE (IB) 73760/51 resp.).*

Jan. 24, 1952.—South Africa. Supply of 6,600 V switchgear for City of Pietermaritzburg. Documents from City Electrical Engineer and Transport Manager, Electricity House, Box 399.

Jan. 30, 1952.—S. Rhodesia. Supply and erection of one 3-phase 11 kV high pressure steam turbo-alternator for most economical rating of 8,000 kW and maximum rating of 10,000 kW; also condensing and evaporating plant for Shabani No. 2 power station. Electricity Supply Commission, P.O. Box 377, Salisbury. B.o.T. (Ref. CRE (IB) 72881/51).*

Feb. 5, 1952.—New Zealand. Supply of one 10,000 kVA, 11kV synchronous condenser for Invercagill substation. State Hydro-Electric Dept., Wellington. Deposit £100.

CONTRACTS PLACED

B.E.A. Barking "C" power station: Supply of 33 kV cables and accessories at Barking "C," Malcolm and Allan (London) Ltd.; generator transformers, Marchwood, Ferranti Ltd.; modifications to 132 kV, 1,500 MVA switchgear and protective equipment, Hams Hall "A," General Electric Co. Ltd.; condensing and feed heating plants for one 30,000 kW turbo-generator, Huddersfield, Richardsons, Westgarth Co. Ltd.; one 45,000 kW turbo-generator and transformer, Thornhill, English Electric Co. Ltd.; 132 kV 3,500 MVA switchgear, Stella North, A. Reyrolle and Co. Ltd.; 132 kV 2,500 MVA switchgear, Smethwick substation, General Electric Co. Ltd.; 132 kV 2,500 MVA switchgear, Clydes Mill substation, Metropolitan Vickers Electrical Co. Ltd.; 132 kV overhead line, Portishead-Lockleaze, 132 kV overhead line, Bathgate Junction, and 132 kV overhead line, Clydes Mill-Newarthill, W. T. Henleys Telegraph Works Co. Ltd.

Glasgow. Electrical installation in large blocks of flats in Berryknowes Rd., James Kilpatrick and Son Ltd., £27,922.

Hull. Supply of 13¼ miles of cable, Henley's Telegraph Works Co. Ltd., £7,437.

Your Queries — Answered

Electro-Mechanical Brake Co., address of? T.E.—This firm is now the E.M.B. Co., Ltd., Moor St., West Bromwich. (21856)

"Solachrome" coffee percolators, makers of? L.E.—F. J. Tomlinson Ltd., Hall Carr Mill, Rawtenstall, Rossendale. (21863)

"Chalmit" lighting fitting, makers of? A.D.—Andrew Chalmers & Mitchell, 445-447 Hillington Rd., Hillington, Glasgow S.W.2. (21872)

Hairdryer for use in connection with a vacuum cleaner, makers of? B.E.—Reliance Vac Spares, 154 The Broadway, Bexleyheath, Kent. (21886)

"Ressel" irons, makers of? R.L.—S. Lesser and Sons (1928) Ltd., Town Hall Buildings, Mare St., E.8. (21889)

"Hesco" electric blankets, makers of? L.H.—Holt Eng. and Mfg. Co., Ltd., Hemco Works, 290 Stockport Rd., Manchester 13. (21896)

The above are selected from questions we have answered this week. If you have a query, send it to us.

ANSWERS WANTED

Y.C.E.D. No. 3 commercial cooker, makers of? S.E. (21851)

"Phonopost" disc recorder, makers of? F.D.B. (21898)

TRADE NOTES

Australian Tariffs. Under recent decisions of the Australian Department of Trade and Customs, electric washing machines now carry a British Preferential duty of £3 each, or 22½% *ad valorem* (whichever returns the higher duty). Household dish-washing machines are not chargeable, but duty on a.c. watt-hour meters is 6s. 8d. each; on electrolytic condensers, 22½% *ad valorem*; and on electric audible warning devices, 1s. 6d. each. Electric motors incorporating gearing are classed as dynamo machines for tariff purposes.

Changes of Address. The London office and sales and exports depts. of Linolite Ltd. are now at 118 Baker St., W.1. Tel.: Welbeck 1150.

The Technical and Scientific Register of the Ministry of Labour and National Service has moved from York House, Kingsway, W.C.2, to Almack House, 26-28 King St., St. James's Sq., S.W.1. Tel.: Trafalgar 7020.

PRICES OF CABLE METALS AND OTHER MATERIALS
(at Tuesday night)

	£ s. d.	New York price
COPPER, electrolytic	227 0 0	£220 0 0
LEAD, good soft pig (foreign)	175 0 0	152 0 0
,, ,, ,, "English" quality	176 10 0	
Tin (99·99·75%) ... ...(Cash)	995 -1000	—
,, (3 months)	977½-980	—
ALUMINIUM, commercial purity (del.)	124 0 0	—
ZINC	190 0 0	156 0 0
ARMOURING:		
Galv. Steel Wire (0·104 in.)	55 5 0	—
Mild Steel Tape (0·04 in.)	32 5 0	—

GAZETTE ANNOUNCEMENTS

COMPANIES ACTS

Glynceiriog Electricity Supply Co. Ltd. Meeting of members to take place at Midland Bank Chambers, High St., Wrexham, on Dec. 5 at 3.30 p.m. to receive liquidator's report.

Hyde, Howard and Co., Ltd. Resolution for voluntary winding-up passed at meeting on Oct. 19. George A. Atkinson, 11 High Petergate, York, was appointed liquidator.

Ilkeston Assisted Wiring and Electrical Appliance Co., Ltd. Meeting of members will take place at 5 East St., Ilkeston, Derby, on Nov. 29 at 3 p.m. to receive liquidator's report.

G. R. Scott (Electrical) Ltd. Creditors of this company and of Alliance Fencing Co., Ltd., Elmwood Builders Ltd., and Warren Marketing Ltd., are asked to send particulars to liquidator, A. J. R. Coward, 317 High Holborn, W.C.1., by Nov. 13.

BANKRUPTCY ACTS

Dividends

Brighton. Reginald Davidson, illuminating engineer, trading at 199 High St., Lewes. First dividend of 2s. 6d. in £ payable at A. E. Orbell and Co., 7 Old Steine, Brighton 1, on Nov. 13.

London. G. and G. Electrical Engineers Ltd., Queensbury, Middlesex. First and final dividends of 9s. in £ payable at 83 Ebury St., S.W.1, on Nov. 16.

Appointment of Liquidator

London. Philipp Clement Ltd., Charlotte St., W.1, electrical and radio retailers. Frederick Goodman, 3 Broad St. Buildings Liverpool St., E.C.2, has been appointed liquidator with committee of inspection.

Receiving Order

Halifax. Albert F. Wood, electrician, trading at Stainland Rd., Halifax. Date of order, Oct. 30.

First Meeting

London. U. V. Beams Ltd., lighting and publicity specialists. Meetings of creditors and contributors at Inveresk House, Strand, W.C.2, tomorrow (Friday) at 11.30 a.m. and 12 noon respectively.

Intended Dividends

Burton-on-Trent. Norman H. Green, electrician, of 66 London Rd., Coalville. Last day for receiving proofs, Nov. 14. Trustee is Ernest Claud Simpson, Official Receiver, 22 Regent St., Park Row, Nottingham.

Administration Order for Deceased Debtor

Croydon. Henry Charles Francis, who traded as electrical engineer at 5a Brighton Rd., Redhill. Date of Order and of filing petition or of transfer, Oct. 25. Whether will or letters of administration, will dated Sept. 17, 1946. Proved or granted on Oct. 11. First Meeting at 3 Central Buildings, Matthew Parker St., S.W.1, on Nov. 12 at 12 noon.

NEW COMPANIES

Extracted from the Register issued by Jordan and Sons, Ltd., 116 Chancery Lane, London, W.C.2.

Carlton Refractories Ltd. Manufacturers of and dealers in insulators and insulating materials, electrical porcelain products etc. Cap.: £10,000. Dirs.: not named. Subs.: G. Brereton, 1 Riverway, Stafford; and A. J. Davenport, 97 Drubbery Lane, Blurton, Stoke-on-Trent.

Edwards (Hall Green) Ltd., 1560 Stratford Rd., Hall Green, Birmingham. Electricians, radio, television and mechanical engineers, etc. Cap.: £2,000. Dirs.: A. R. Edwards, Betty Edwards, G. V. Fenton, and Joan E. Fenton.

Lord's Controls Ltd., 77a High St., Camberley, Surrey. To take over business of Lord's Controls carried on at Camberley, Surrey, by Ralph E. C. Lord and Gordon A. Side, and to carry on business of engineers (electrical) and contractors, etc. Cap.: £2,000. Dirs.: R. E. C. Lord and G. A. Side.

Scientific Electrical Services Ltd. Dealers in wireless, radio, television, electrical, domestic and household sets, appliances and goods, etc. Nom. cap.: £20,000. Dirs.: not named. Subs.: D. C. Wenk and L. F. Louvray, 46 John St., Luton, Beds.

S.E.T.A. Ltd. To acquire from C. L. Strong the patents and rights in connection with certain electro-therapeutic apparatus owned and invented by him. Nom. cap.: £100. Dirs.: to be appointed by subs. Subs.: J. H. Hussey, 87 Woodfield Drive, Gidea Park, Essex and W. F. Parcell, 36 Silverthorn Gardens, E.4.

Summerstrand (Refrigeration) Ltd., Offices of Keeling and Co., Crown Chmbrs, 118, Chancery Lane, W.C.2. Cap.: £5,000. Permt. dir.: P. J. J. Macy.

BUSINESS PROSPECTS

HOME

Aldridge U.D.C. Erection of 22 houses in Bickley Rd. Thos. H. Partridge, Council House, Aldridge.

Bedfordshire. Cost of proposed Arlesey and Stotfold county secondary school is estimated at £138,000. County Architect, Shire Hall.

Bideford. T.C. to build 48 houses in the district.

Birkenhead T.C. Construction of first part of Christ Church primary school. Leonard Barnish, 58 Rodney St., Liverpool.

Bolton. Extensions proposed to physiotherapy department at District General Hospital at estimated cost of £9,900.

Brighton. Tenders expected to be invited soon for erection of Varndean secondary school at cost of about £169,000.

Bury (Lancs.). Manchester Regional Hospital Board proposes the conversion of Fairfield House electricity supply at Fairfield General Hospital.

Croydon. R. Atkinson, 13 Manchester Sq., W.1, is architect for proposed technical college estimated to cost between £1,250,000 and £1,500,000.

Dover T.C. Tenders to be invited shortly for erection of 32 flats on Durham Hill. It is proposed also to build 92 dwellings on Buckland Valley estate.

Dumfries T.C. Dean of Guild Court has approved erection of 74 houses in New Abbey Road.

Durham. Addition to Wolsingham grammar school will be carried out shortly. E.C. is to spend £450 on replacing existing electrical installation at Clara Vale county school. Also erection of High Usworth county primary infants' school. County Architect, Court Lane.

Erith (Kent) T.C. Erection of 48 houses and 4 bungalows on Matfield Rd. site. John H. Clayton, Borough Engineer and Surveyor, Town Hall. Also approval received for second part of construction of grammar school in Northumberland Heath. Estimated cost of this part only is £65,000.

Exeter. It is proposed to build 119 houses on Stoke Hill estate.

Golborne U.D.C. Construction of 30 houses at Culchetch. J. B. Hoyle, engineer and surveyor, Council offices, Lowton, nr. Warrington.

Hastings T.C. S.E. Metropolitan Regional Hospital Board has approved provision of outpatients' department at Royal E. Sussex Hospital.

Hinckley U.D.C. Approval granted for erection of 106 houses at total cost of £133,355. Erection of 16 houses and 6 shops on Sketchley Hill estate.

Hornchurch (Essex) U.D.C. Scheme approved for erection of 64 maisonettes.

Kidderminster T.C. Erection of shops and flats on Birchen Coppice estate. Borough Engineer and Surveyor, 110 Mill Street.

London C.C. proposes to invite tenders soon for electrical work at ten primary or secondary schools. Project is estimated to cost £36,980.

Maidenhead T.C. Work expected to start soon on erection of 48 flats in 12 blocks.

Motherwell. Dean of Guild Court approved an extension scheme at steelworks for Colvilles Ltd., West George St., Glasgow. Scheme to cost £80,000.

Middlesbrough. J. Wilson and Son, Ltd., are seeking permission to build a factory extension of East Middlesbrough Industrial estate. Also 78 houses to be erected on Berwick Hills site.

Newburn-on-Tyne U.D.C. Wiring in 33 houses and 6 shops and flats at Lemington proposed. Surveyor is J. A. Weatherley.

Newcastle-on-Tyne. Construction of primary school in Denton Sq. H. V. Lightfoot, City Education Office, Northumberland Road.

Northallerton U.D.C. Tenders expected to be invited shortly for erection of 54 houses in Linden Road.

Norwich. It is proposed to build a secondary modern school costing some £151,733 at New Lakenham.

Oldham T.C. Erection of 11 shops and 12 maisonettes on Limeside estate. Cameron and Middleton, chartered quantity surveyors, 32 Deansgate, Manchester.

Otley U.D.C. Erection of 20 houses in Weston Lane. Engineer and Surveyor, Council Offices, North Parade.

Oxfordshire. Approval received for erection of an instalment of Henley Technical Institute.

Penryn T.C. Approval granted for erection of 33 houses on Saracen estate.

Plymouth. Erection of primary school at Whitleigh. Architects, Louis de Soissons and Partners, 5 Portland Sq., Plymouth.

Poplar B.C. Rider, Hunt and Partners, Bridge House, Queen Victoria St., E.C.4, have been recommended as quantity surveyor for erection of block of 45 flats and maisonettes in Tetley St. area.

Southall. Cramic Engineering Co., Ltd., 97 Western Rd., propose to carry out erection of offices, extensions, in Factory Bridge Rd. Approval granted to Le Grand, Sutcliff and Gell, Ltd., for erection of trimming shop at Magdala Works, The Green.

Stowmarket U.D.C. Erection of 24 flats on Recreation Rd. estate. J. Black, Engineer and Surveyor, Council Offices, Ipswich Rd.

Tottenham B.C. Building of 30 houses at Edmonton. Borough Engineer, Town Hall, N.15.

Wandsworth B.C. Tenders to be invited shortly for building of 370 dwellings on Putney Vale site at total estimated cost of £722,770.

OVERSEAS

Canada. H. P. Ruggles and Co., 195 John St. North, Hamilton, Ontario, requires insulating materials: varnished cambric tubing, varnished paper, fibreboard and glass tape. Communications to Mr. H. P. Ruggles.

Mexico. Agencies for electric plants (small units for farms, etc.) wanted by Sr. Adolfo Sanchez, San Felipe 178, Guadalajara, Jalisco.

TRADE MARKS

This information is extracted from the Official Journal by permission of the Controller.

Ela. 698,527. Class 11. Sterilising and drying ovens, and humidity cabinets, etc. Electricals Ltd., 14 Claremont Place, Newcastle-upon-Tyne.

Igloo. 698,933. Class 9. Liquid level indicators, valves for the automatic control of pressure and temperature for use in refrigerating systems, thermostats and switchgear. Igloo Ltd., Cunliffe Rd., Park Rd. Corner, Blackpool.

Wair. B.698,701. Class 11. Air purifying apparatus, fans, fires, refrigerators, torches, etc. J. Lyons and Co., Ltd., Cadby Hall, W.14.

MEETINGS TO NOTE

THURSDAY, NOV. 8

A.S.E.E. (Bristol Branch).—"Fluorescent Lighting and the Maintenance Engineer." A. G. Mitchell. Grand Hotel, 7.30 p.m.

I.E.E. (London).—"London-Birmingham Television-cable System." T. Kilvington, F. J. M. Laver and H. Stanesby. Savoy Place, 5.30 p.m.

I.E.E. (E. Midland Centre).—"Deterioration of Mains Cables due to External Causes." P. W. Cave. District meeting at George Hotel, Kettering, 7 p.m.

I.E.E. (N.E. Scotland Sub-centre).—"Evolution of Lighting Art." J. W. T. Walsh. Royal Hotel, Dundee, 7 p.m.

I.E.E. (W. Wales Sub-centre).—"Protection of Electrical Power Systems." H. Leyburn and C. H. W. Lackey. Plaza Cinema, Swansea, 6 p.m.

I.E.S. (Glasgow Centre).—"Indoor and Outdoor Sports Lighting." D. E. Beard. 39 Elmbank Cres., 6.30 p.m.

I.E.S. (Manchester Centre).—"Hospital Lighting." D. J. Reed and M. W. Peirce. Town Hall Extension, 6 p.m.

ELECT. POWER ENGRS. ASSOC. (Merseyside Tech. Group).—"Power Station Lubrication." G. H. Clarke. Elect. Showroom, Whitechapel, Liverpool, 7 p.m.

BRITISH INSTN. OF RADIO ENGRS. (Scottish Section).—"The Brain as a Piece of Communication Equipment." H. W. Shipton, Inst. of Engrs. and Shipbuilders, Glasgow, 7 p.m.

INCORP. PLANT ENGRS. (Newcastle Branch).—"Plant Engineer and the Factories Act." F. W. Thompson. Roadway House, Oxford St., 7.30 p.m.

FRIDAY, NOV. 9

A.S.E.E. (Crewe Branch).—"Electric Welding." W. Barnett. Crewe Arms Hotel, 7.30 p.m.

I.E.E. (Tees-side Sub-centre).—Annual dinner at Zetland Hotel, Saltburn-by-the-Sea.

I.E.S. (Birmingham Centre).—Ladies' Night at Imperial Hotel.

I.E.E. (N.E. Students' Section).—"Electronic Motor Control." C. R. Bates. King's College, Newcastle, 6.30 p.m.

ELECTRICAL INDUSTRIES BALL in aid of E.I.B.A. Grosvenor House, Park Lane, W.1, 7 p.m.

JNR. INSTN. OF ENGINEERS.—"The Engineer and Safety." F. M. Panzetta. 39 Victoria St., S.W.1, 6.30 p.m.

SOCIETY OF FRENCH CIVIL ENGINEERS (British Section).—"Development of Hydraulic Power Production and H.T. Transmission in France." R. Brougniart. I.E.E. Lecture Hall, Savoy Place, 5.30 p.m.

E.P.E.A. (Southern Meter Engrs. Group).—"Use of C.R.O. to Meter and Test Engineers." O. H. Davie. Caxton Hall, S.W.1, 6.30 p.m.

MONDAY, NOV. 12

I.E.E. (London Education Circle).—Discussion on "Equipment of Electrical Engineering Laboratory," opened by A. Draper and T. Siklos. Savoy Place, 6 p.m.

I.E.E. (Mersey and N. Wales Centre).—Annual dinner at Exchange Hotel, Liverpool.

I.E.E. (N.E. Centre).—"Protection of Electrical Power Systems." H. Leyburn and C. H. W. Lackey. Neville Hall, Westgate St., Newcastle, 6.15 p.m.

I.E.E. (S. Midland Supply and Utilization Group).—"Electrical Control of Dangerous Machinery and Processes."—Part 3." W. Fordham Cooper. Imperial Hotel, Birmingham, 6 p.m.

I.E.E. (Western Centre).—"Development of Electrical System in Bristol Brabazon Aircraft." M. J. J. Cronin. S.W.E.B., Colston Ave., Bristol, 6 p.m.

I.E.E. (Ipswich).—"Television." (Lecturer not known). Crown and Anchor Hotel, 6.30 p.m.

ELEC. POWER ENGRS. ASSOC.—"Boiler Plant—Present and Future." W. F. Simonson. Caxton Hall, London, 7 p.m.

PURCHASING OFFICERS ASSOC.—"Production and Uses of Copper." Dr. E. Voce. Royal Society of Arts, W.C.2, 7.30 p.m.

TUESDAY, NOV. 13

I.E.E. (N. Midland Centre).—"Nervous System as a Communication Network." J. A. V. Bates Hotel Metropole, Leeds, 6.30 p.m.

I.E.E. (N.W. Measurements Utilization and Supply Groups).—Discussion on "Survey of Methods of Limiting Maximum Demand," opened by T. W. Ross and A. H. Gray. Engrs. Club, Albert Sq., Manchester, 6.15 p.m.

I.E.E. (N. Ireland Centre).—"Control of Hydro-Electric Plant." A. C. H. Frost and W. Brittlebank. Presbyterian Hotel, Belfast, 6.45 p.m.

I.E.E. (Scottish Centre).—Dinner dance at Grosvenor Restaurant, Glasgow, 6 p.m.

I.E.S. (London).—"Equipment of an Illumination Laboratory." H. F. Stephenson. L. S. B., Savoy Hill, 6 p.m.

I.E.S. (Liverpool Centre).—"Lighting of Architecture." G. Grenfell Baines. M.A.N.W.E.B., Whitechapel, 6 p.m.

INSTN. OF HEATING AND VENTILATING ENGRS. (S.W. Branch).—"House of Commons' Heating and Ventilating Systems." J. R. Kell. G.E.C. Building, Cathays Park, Cardiff 6.30 p.m.

NEWPORT ELECTRIC CLUB.—Meeting at Tredegar Arms Hotel, 7 p.m.

WEDNESDAY, NOV. 14

I.E.E. (London Radio Section).—"Life of Oxide Cathodes in Modern Receiving Valves." G. H. Metson, S. Wagener, M. F. Holmes and M. R. Child. Savoy Place, 5.30 p.m.

I.E.E. (N. Midland Centre).—"Evolution of the Lighting Art." J. W. T. Walsh. L. E. B., Ferensway, Hull, 7.30 p.m.

I.E.E. (N. Lancs sub-centre).—"Development of Electrical System on Bristol Brabazon Aircraft." M. J. J. Cronin. Harris Inst., Corporation St., Preston, 7 p.m.

I.E.E. (Southern Centre).—"Electricity in this Century." E. R. Logan. R.A.E. College, Farnborough, 7.30 p.m.

I.E.E. (Oxford).—"Electricity Supply Distribution." W. F. Sands and J. L. Taylor. S.E.B., 37 George St., 7 p.m.

BRITISH INSTN. OF RADIO ENGRS. (N.E. Section).—"TV Aerial Design." G. L. Stephens. Neville Hall, Westgate St., Newcastle, 6 p.m.

INCORP. PLANT ENGRS. (E. Midlands Branch).—"Combined Heat and Power Installations." W. O. Goldthorpe. Welbeck Hotel, Nottingham, 7 p.m.

PURCHASING OFFICERS ASSOC. (Tees-side Branch).—Films by Quasi Arc Co. and Wolf Electric Tools Ltd. Cleveland Scientific and Technical Inst., Middlesbrough, 7.30 p.m.

BRADFORD INDUSTRIAL SAFETY AND WELFARE ASSOC.—First annual dinner at Midland Hotel, Bradford, 7.30 p.m.

THURSDAY, NOV. 15

I.E.E. (Irish Branch).—"Maintenance Methods Developed in Ardnacrusha-Hydro-Station to meet Emergency Conditions." P. Byrne. Trinity College, Dublin, 6 p.m.

I.E.S. (Gloucester and Cheltenham Centre).—"Film Studio Lighting." W. R. Stevens. G.E.C. Ltd., St. Aldgate St., Gloucester, 6.15 p.m.

WORCESTER ELECTRIC CLUB.—"Radio Frequencies." A. H. White. Talbot Hotel, Tything, 7.15 p.m.

INCORP. PLANT ENGRS. (Liverpool Branch).—"Industrial Ventilation." L. Gordon Davies. Radiant House, Bold St., 7.15 p.m.

A.S.E.E. (Kent Branch).—"Capacitors." T. A. Williams. Royal Star Hotel, Maidstone, 8 p.m.

FRIDAY, NOV. 16

I.E.E. (N. Midland Centre).—Annual dinner at Queen's Hotel, Leeds.

MANCHESTER ASSOC. OF ENGRS.—"Engineering Inspection and Metrology." W. E. London. Engineers' Club, Albert Sq., 6.45 p.m.

JRN. INSTN. OF ENGINEERS.—"Cranes and Lifting Machinery." P. B. Hebbert. 39 Victoria St., S.W.1, 6.30 p.m.

I.E.E. (N. Lancs Sub-Centre).—Dinner-dance at Cliffs Hotel, North Shore, Blackpool, 6.30 p.m.

A.S.E.E. (Liverpool Branch).—"Television." P. S. Hersey. Elect. Service Centre, Whitechapel, 7.30 p.m.

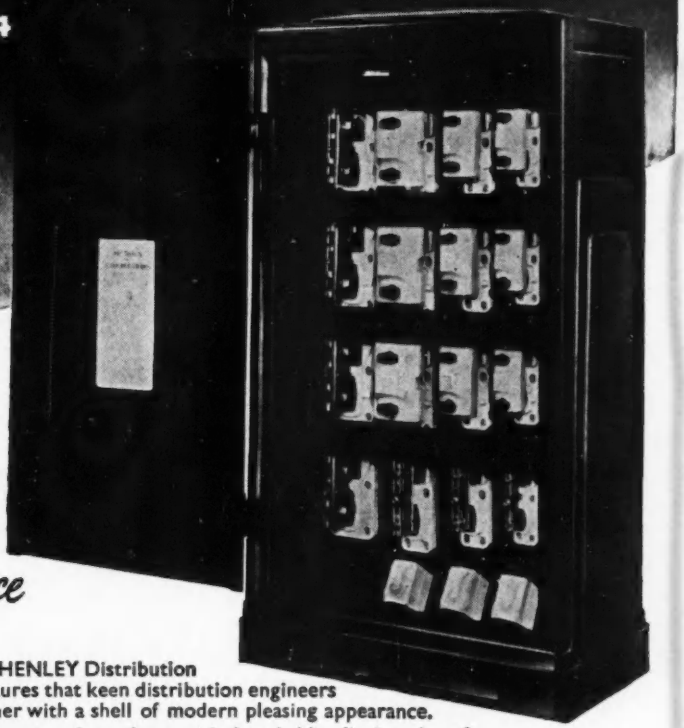
SATURDAY, NOV. 17

A.S.E.E. (Oxford Branch).—"Space Heating." C. B. Cleland. S.E.B., George St., 3 p.m.

HENLEY *Modern*

DISTRIBUTION PILLARS AND PANELS

GROUP 24



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Embodied in the new HENLEY Distribution Pillars are all those features that keen distribution engineers are looking for, together with a shell of modern pleasing appearance.

Robust cast-iron construction throughout with detachable plinth and roof.

Adequate provision for ventilation.

One-piece insulating right-angle type shields acting as phase barriers and vertical front shields for busbars.

Four sizes of Units are available, 200 to 1,000 amp, suitable for 3-phase 4-wire systems with cartridge fuse-link protection up to 60 amp for fifth core, if required. Units for other systems can be supplied.

One-piece insulators with specially designed entry to facilitate insertion or removal of conductor fittings.

Conductor fittings are reversible and interchangeable. Crossing of conductor cores is avoided.

Height 3′ 11″ above ground. Depth 14½″.

Enquiries invited. Please ask for Folder 24/A

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Representative of Weston portable instruments, is the Model S.103 — a moving iron type of instrument, designed for a wide range of measurements to first grade accuracy on both A.C. and D.C. The 6" scale is linear over the whole of its working range and a knife-edge pointer and anti-parallax mirror are provided to facilitate accurate reading. The instrument is supplied as a Milliammeter, Ammeter or Voltmeter. Full details of the Model S.103 and of the Model S.82—available in D.C., A.C. rectifier and thermocouple types, are available on request.

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CLASSIFIED ADVERTISEMENTS

OFFICIAL TENDERS AND APPOINTMENTS

WANTED · FOR SALE WORK WANTED

Those wishing to advertise in these pages should send the text to the Classified Advertisement Dept., Electrical Times, Sardinia House, Sardinia St., London W.C.2, before 10 a.m. on TUESDAY of week of issue. Official Displayed Advertisements are charged at 42s. per inch, and all other classified advertisements at 3s. 0d. per line. Situations Wanted will be published four times for twice the single insertion rate. Fee for Box No. and postage on replies is 2s.

TENDERS INVITED

CITY OF BELFAST

Electricity Department

COAL HANDLING PLANT, VICTORIA POWER STATION

TENDERS are invited for the supply, delivery and erection of complete coal handling plant required for Victoria Power Station, Belfast, including a 300 ton per hour 200 ft span travelling reclaiming transporter, 150 to 300 tons per hour coal conveyors, structural steelwork, housings, automatic weighers, and all ancillary equipment.

Form of tender (No. N.1077), conditions and specification, in quadruplicate, may be obtained from Messrs. Merz and McLellan, Consulting Engineers, Carliol House, Newcastle-upon-Tyne 1, on payment of a deposit of five guineas (cheques to be made payable to the Belfast Corporation Electricity Department) which will be refunded provided a bona fide tender be lodged and not withdrawn. Extra copies of the contract documents may be obtained at three guineas per set, which sum will not be returnable.

The Corporation will consider only offers for the whole of the plant specified.

Each tender, in quadruplicate, in sealed envelope marked "Tender for Coal Handling Plant, Electricity Committee," and endorsed with the name and address of the tenderer, must reach the undersigned not later than 4 p.m. on Friday, January 4, 1952.

An official receipt must be obtained for each tender delivered by hand. Tenders sent by post should be registered. The lowest or any tender will not necessarily be accepted.

JOHN DUNLOP,
Town Clerk.

City Hall, Belfast.
November 2, 1951. (P 94)

HINCKLEY URBAN DISTRICT COUNCIL

TRUNK ROAD LIGHTING

TENDERS are invited for the supply and installation of:—

(a) 180 CONCRETE COLUMNS for Group A lighting.
(b) 180 LANTERNS, CHOKES, CAPACITORS for Group A lighting.

Conditions of contract and plans may be seen at, and specification, quantities and form of tender obtained from, the office of the Lighting Engineer, Mr. H. M. Ethengrton, B.Sc., A.M.I.C.E., 9 Station Road, Hinckley, upon payment of a deposit of two guineas, which will be returned upon receipt of a bona fide tender.

Separate tenders for each or either part, sealed and endorsed "Trunk Road Lighting," are to be forwarded to the undersigned not later than 10 a.m. on Saturday, December 1, 1951. The Council does not bind itself to accept the lowest or any tender.

J. G. S. TOMPKINS,
Clerk of the Council.

16 Station Road,
Hinckley, Leics.
October 31, 1951. (P 64)

APPOINTMENTS VACANT

SOUTH WALES ELECTRICITY BOARD

REQUIRED, an ASSISTANT ENGINEER in District 462 (Newport) in the Eastern Sub-Area.

Candidates should be suitably qualified and have experience in construction and maintenance of mains and substations.

The salary will be in accordance with Class "F," Grade 11 (£528 to £537 to £545) of the N.J.B. Schedule.

Applications, stating age, present position and salary, qualifications and experience and giving three referees, to be addressed to the Secretary (Establishments), South Wales Electricity Board, St. Mellons, Cardiff, so as to reach him by November 17, 1951.

D. G. DODDS, Secretary. (P 101)

SOUTHERN ELECTRICITY BOARD

APPLICATIONS are invited for the following posts:—

INSTALLATION ENGINEER

Aldershot District of No. 3 (Portsmouth) Sub-Area. Salary N.J.B. Class "F," Grade 9, Column 1 (£587 per annum). N.J.B. conditions of service.

Applicants should be qualified to accept responsibility for all installation and maintenance work in the District and branches, and to collaborate with the Development Engineer and District Commercial Engineer in the preparation of estimates for contracting work, particularly those of an exceptional nature. The duties will also extend to the branches.

Applications on forms obtainable from the Sub-Area Secretary, Lower Drayton Lane, Cosham, Portsmouth, and returned to him in envelopes endorsed "Installation Engineer, Aldershot" not later than November 19, 1951.

JUNIOR ENGINEER

Isle of Wight District of No. 3 (Portsmouth) Sub-Area. Salary N.J.B. Class "E," Grade 15, Column 1 (£375 per annum). N.J.B. conditions of service.

Applicants should have experience in the design, construction, operation and maintenance of h.v. and l.v. overhead and underground distribution systems, substation plant and distribution equipment, and possess suitable technical qualifications. The appointment will involve standby duties.

Applications on forms obtainable from the Sub-Area Secretary, Lower Drayton Lane, Cosham, Portsmouth, and returned to him in envelopes endorsed "Junior Engineer" not later than November 19, 1951.

JUNIOR ENGINEER

Portsmouth District of No. 3 (Portsmouth) Sub-Area. Salary N.J.B. Class "F," Grade 15, Column 1 (£375 per annum). N.J.B. conditions of service.

Applicants should have experience in the design, construction, operation and maintenance of h.v. and l.v. overhead and underground distribution systems, substation plant and distribution equipment, and possess suitable technical qualifications. The appointment will involve standby duties.

Applications on forms obtainable from the Sub-Area Secretary, Lower Drayton Lane, Cosham, Portsmouth, and returned to him in envelopes endorsed "Junior Engineer" not later than November 19, 1951.

The successful candidates for the above appointments will be required to contribute to the B.E.A. and Area Boards' Superannuation Scheme, if eligible.

F. W. KEMPTON,
Secretary.

November 8, 1951. (P 96)

LONDON ELECTRICITY BOARD

ENGINEER (CONSTRUCTION)

APPLICATIONS are invited for the above position in the North Eastern Sub-Area Construction Branch at Stratford, E.15.

Applicants should have had a sound technical education with at least a National Certificate in building construction. They would be required to assist the Sub-Area Building Superintendent in preparing bills of quantities, measuring up and setting out new work, general maintenance of the Board's buildings and also have had drawing board experience. In addition to having the necessary technical and practical knowledge of construction work, they should also possess knowledge of the working conditions and rates applicable to the building and civil engineering manual workers in the electricity supply industry.

The post is graded under Schedule "A" of the National Joint Board Agreement as Class "K," Grade 10—£733 19s. per annum, rising to £764 8s. per annum, inclusive of London Allowance.

Application forms obtainable from Establishments Officer, 46 New Broad Street, E.C.2, to be returned, duly completed, by November 19, 1951. Please enclose addressed foolscap envelope and quote ref. V/1352/T on all correspondence. (P 105)

BRITISH ELECTRICITY AUTHORITY

East Midlands Division

OPERATION ENGINEER AND SHIFT CHARGE ENGINEER, STAYTHORPE

APPLICATIONS are invited for the following positions at the Staythorpe Generating Station:—

(a) OPERATION ENGINEER.

Applicants should preferably possess corporate membership of the Institution of Electrical or Mechanical Engineers, but candidates with a Higher National Certificate in Electrical or Mechanical Engineering or who hold equivalent qualifications will be given consideration. In addition, candidates must have had considerable practical experience in the operation of a large generating station. The successful applicant will be responsible to the Power Station Superintendent for the efficient operation and testing of the plant and for technical investigations. Salary will be in accordance with the N.J.B. Schedule, Class "J," Grade 5.

(b) SHIFT CHARGE ENGINEER.

Applicants must have had considerable experience in a modern generating station and preference will be given to candidates who are corporate or graduate members of the Institution of Electrical or Mechanical Engineers, or who hold similar qualifications. Salary will be in accordance with the N.J.B. Schedule, Class "J," Grade 7.

These posts are superannuable within the provisions of the British Electricity Authority and Area Boards Superannuation Scheme.

Applications should be submitted on the official form which may be obtained from the Divisional Establishments Officer, British Electricity Authority, British Electricity House, Barker Gate, Nottingham, and should be returned not later than November 26, 1951.

L. F. JEFFREY,
Divisional Controller.
(P 106)

BRITISH ELECTRICITY AUTHORITY

Eastern Division

APPLICATIONS are invited for the following appointment:—

FIRST ASSISTANT STATION CHEMIST—LITTLE BARFORD GENERATING STATION

Salary will be in accordance with the N.J.B. Agreement, Revised Schedule "A," Class "G," Grade 9, £621-£648 per annum.

Applicants who possess a B.Sc. degree or an equivalent qualification will be preferred, and they must have practical experience in the sampling and analysis of fuel, oil and water. Applicants should also be conversant with the control of boiler feed-water treatment and of water softeners, and they should have a good general knowledge of the chemical and metallurgical aspects of modern power station practice.

The appointment will be superannuable in accordance with the British Electricity Authority and Area Boards Superannuation Scheme.

Applications, stating age, experience and present position should be sent to the Divisional Controller, British Electricity Authority, Eastern Division, Northmet House, Southgate, London N.14, to arrive not later than November 23, 1951. Envelopes should be endorsed First Assistant Station Chemist—Little Barford."

W. N. C. CLINCH,
Controller.
Northmet House, Southgate, N.14. (P 87)

SOUTH EAST SCOTLAND ELECTRICITY BOARD

Southern Sub-Area

APPLICATIONS are invited for the following appointments:—

1. FIRST ASSISTANT DISTRICT ENGINEER (Hawick District). Salary and conditions of service in accordance with the N.J.B. Schedule, Class "B," Grade 5 (£605 to £622 to £639). Applicants should have had considerable experience in the construction, operation and maintenance of h.v. and l.v. rural and urban distribution systems. It is possible that a small flat may be available to let to the successful candidate.

2. JUNIOR ENGINEER. Salary and conditions of service in accordance with the N.J.B. Schedule, Class "G," Grade 16 (£375 to £381 to £387). Applicants should be young engineers wishing to gain further experience in rural and urban distribution work. The successful candidate will be posted initially to Berwick-on-Tweed.

Applicants for both the above vacancies must have had a sound practical training and preference will be given to those holding the Higher National Certificate or equivalent. The appointments will be superannuable.

Applications, stating age, whether married or single, particulars of education, training, experience and positions held should reach the undersigned not later than 14 days after the appearance of this advertisement.

G. H. SANKEY,
Sub-Area Manager.

High Street,
Galashiels. (P 67)

BRITISH ELECTRICITY AUTHORITY

North Western Division

APPLICATIONS are invited for the following superannuable positions:—

No. 595. SHIFT CHARGE ENGINEER, Padiham Generating Station

The salary for this post will be in accordance with Grade 7, Class "E" of the N.J.B. Agreement, i.e. £629 to £660 per annum.

Candidates should possess a Higher National Certificate and be fully conversant with power station operation.

No. 596. STATION SHIFT CONTROL ENGINEER, Whitebirk Generating Station, Blackburn

The salary for this post will be in accordance with Grade 10, Class "F," of the N.J.B. Agreement, i.e. £557 to £578 per annum.

Candidates should be educated up to Higher National Certificate standard and have had some experience in a generating station.

Applications, quoting vacancy number, stating age, qualifications, present position, and giving full details of education and experience, should be received by the Establishment Officer, British Electricity House, Wilmslow Road, East Didsbury, Manchester 20, not later than November 14, 1951. (P 66)

BRITISH ELECTRICITY AUTHORITY

South Western Division

SHIFT CHARGE ENGINEER—PORTISHEAD "A" GENERATING STATION

APPLICATIONS are invited for the position of Shift Charge Engineer at Portishead "A" Generating Station.

Candidates must have had considerable experience in the operation of a modern generating station and preference will be given to candidates who are Corporate or Graduate Members of the Institution of Electrical Engineers and/or the Institution of Mechanical Engineers, or who hold equivalent qualifications.

Salary and conditions of service will be in accordance with the National Joint Board Agreement, Class "J," Grade 7, £792 to £828 per annum.

The appointment will be superannuable in accordance with the British Electricity Authority and Area Boards Superannuation Scheme.

Applications, stating age, qualifications, full details of experience, present appointment and salary, should be addressed to the Divisional Secretary, British Electricity Authority, South Western Division, British Electricity House, 26 Oakfield Road, Bristol 8, so as to be received not later than November 15, 1951.

R. C. BARRETT,
Divisional Secretary.
October 30, 1951. (P 65)

BRITISH ELECTRICITY AUTHORITY

WELFARE OFFICER

APPLICATIONS are invited for the appointment of Welfare Officer in the Training, Safety and Welfare Department of the Authority's Headquarters in London.

Candidates should possess wide experience in the organisation of welfare work in industrial undertakings and be capable of administering sections (each with a Specialist Officer in charge) dealing with catering, recreation, and general welfare (including amenities standards, benevolent funds, case work, etc.).

The appointment, which is superannuable, will be made within the provisional salary range of £1,500 to £2,000 per annum.

Letters of application, stating age, present salary, and giving full particulars of qualifications and experience, should be sent to D. Moffat, Director of Establishments, British Electricity House, Great Portland Street, London, W.1, to arrive not later than November 24, 1951.

Please quote reference AE/219. (P 99)

LONDON ELECTRICITY BOARD

SENIOR DRAUGHTSMEN

APPLICATIONS are invited for two positions as Senior Draughtsman in the Northern Sub-Area Design and Planning Branch at Aldersgate Street, E.C.1.

Candidates should have the requisite training and experience to prepare layouts of switchgear, building drawings for substations and transformer chambers, together with necessary calculations for steel work and concrete, etc., for structures required in connection with substations up to 11 kV.

The posts are graded under Schedule "D" of the National Joint Board agreement as Senior Draughtsmen, Grade 5, £574 7s. 0d. to £683 11s. 0d. per annum, inclusive of London Allowance.

Application forms obtainable from Establishments Officer, 46 New Broad Street, E.C.2, to be returned duly completed, by November 19, 1951. Please enclose addressed foolscap envelope and quote ref. V/1349/T on all correspondence. (P 68)

YORKSHIRE ELECTRICITY BOARD

APPLICATIONS are invited for the following appointments:—

AREA BOARD HEADQUARTERS
Chief Engineer's Department
System Design Section

SECOND ASSISTANT ENGINEER (Vacancy No. 142/51.

Applicants should have wide experience in the Electricity Supply Industry and particular experience in the design and development of distribution systems up to and including 66 kV and the preparation of technical reports and digests of data. An honours degree in electrical engineering and corporate membership of the Institution of Electrical Engineers are desirable.

Applicants should give details of experience especially in the following branches:—

(a) Special investigations into the economics of distribution up to 66 kV.
(b) Stability and other network calculations.
(c) Applications of protective gear.
(d) Manufacture of electrical plant.
(e) Construction, maintenance and operation of 66 kV and 33 kV networks.
(f) Statistical treatment of data.

Salary—N.J.B. Schedule "C," "AX-DX," 2. £809/£945 rising to £1,028 per annum.

Applications, stating the above vacancy number, and giving full details of age and qualifications, should be forwarded to the Secretary, Yorkshire Electricity Board, Wetherby Road, Scarcroft, Leeds, not later than fourteen days after the appearance of this advertisement.

No. 1 (Bradford) Sub-Area

SECOND ASSISTANT ENGINEER (Meters, Testing and Protection)—(Vacancy No. 123/51)

Applicants should possess technical qualifications equivalent to those for corporate membership of the Institution of Electrical Engineers and have such experience as will enable them efficiently to assist with the control of the Sub-Area Meters, testing and protection department with especial concern for fault location on systems operating at various voltages up to 66 kV.

Salary—N.J.B. Schedule Class "K," Grade 7, £844/£881 per annum.

Applications, stating the above vacancy number, and giving full details of age, qualifications, and experience, should be forwarded to the Manager, No. 1 (Bradford) Sub-Area, Yorkshire Electricity Board, 45-53 Sunbridge Road, Bradford, within fourteen days of the appearance of this advertisement.

No. 3 (Sheffield) Sub-Area

SECOND ASSISTANT ENGINEER (Distribution Design) (Vacancy No. 143/51)

Candidates should have sound practical and technical knowledge of constructional work on underground and overhead distribution systems, and have had extensive experience with a high measure of responsibility for the design and planning of distribution systems at voltages up to 33 kV for heavy industrial, city, urban and rural areas. Experience in the preparation of technical specifications is desirable.

Applicants should be corporate members of the Institution of Electrical Engineers, and possession of an engineering degree will be an advantage.

Salary—N.J.B. Schedule Class "M," Grade 7, £961/£992 per annum.

THIRD ASSISTANT ENGINEER (Distribution Design) (Vacancy No. 143/51)

Candidates should have sound experience in construction and operation on industrial, urban and rural distribution systems, and have had experience in the design and planning of both underground and overhead systems at voltages up to 33 kV.

Applicants should be corporate members of the Institution of Electrical Engineers.

Salary—N.J.B. Schedule Class "M," Grade 10, £783/£808 per annum.

GENERAL ASSISTANT ENGINEER (Distribution Design) (Vacancy No. 144/51)

Applicants should hold at least the Higher National Certificate in Electrical Engineering and have had construction experience on overhead and underground distribution systems up to 11 kV. Experience in planning and estimating will be an advantage.

Salary—N.J.B. Schedule Class "M," Grade 13, £641/£661 per annum.

THIRD ASSISTANT DISTRICT ENGINEER (Sheffield South) (Vacancy No. 115/51)

Applicants must have technical qualifications equivalent to corporate membership of the Institution of Electrical Engineers.

The successful candidate will be expected to supervise construction and maintenance work and carry out operation duties on 11 kV and L.v. overhead and underground mains in a district containing a heavy industrial and densely developed residential area surrounded by a rural area.

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Salary—N.J.B. Schedule Class "G," Grade 9, £621/£648 per annum.

Applications, stating the above vacancy numbers, and giving full details of age, qualifications, and experience, should be forwarded to the Manager, No. 3 (Sheffield) Sub-Area, Yorkshire Electricity Board, Commercial Street, Sheffield, within fourteen days of the appearance of this advertisement.

No. 5 (Wakefield) Sub-Area

THIRD ASSISTANT DISTRICT ENGINEER (Castleford) (Vacancy No. 141/51)

Applicants should have had experience in the maintenance of e.h.v. overhead and underground mains. Experience in fault location and supervision of jointing, cable laying and the erection of overhead lines, will be an advantage.

Salary—N.J.B. Schedule Class "E," Grade 9, £567/£579 per annum.

Applications, stating the above vacancy number, and giving full details of age, qualifications, and experience, should be forwarded to the Manager, No. 5 (Wakefield) Sub-Area, Yorkshire Electricity Board, 1a Denby Dale Road, Wakefield, within fourteen days of the appearance of this advertisement. (P 88)

MERSEYSIDE AND NORTH WALES ELECTRICITY BOARD

APPLICATIONS are invited for the following appointments in the Board's No. 3 Sub-Area Headquarters at Chester:—

(1) GENERAL ASSISTANT ENGINEER. Salary £503 to £522 per annum (N.J.B. Schedule "A," H.13).
(2) SURVEYOR. Salary within the range £413 to £547 per annum, according to capabilities and experience. (N.J.B. Schedule "D," Grade 6.)

Applicants for both positions should preferably possess the Higher National Certificate in Electrical Engineering. Preference will be given to applicants for post (1) who have some experience of h.v. and l.v. distribution and general drawing office work. Applicants for post (2) should have a knowledge of drawing office work, and experience in field survey work as applicable to the installation of overhead and underground lines will be an advantage.

The appointments are superannuable and subject to medical examination.

Applications, on forms obtainable by written request from the Manager, Ref. 15A, No. 3 Sub-Area, Merseyside and North Wales Electricity Board, Electricity House, Newgate Street, Chester, should be returned not later than November 20, 1951.

JAMES RANKIN,
Secretary.
(P 97)

KENT COUNTY COUNCIL

APPLICATIONS are invited for appointment in the Buildings Department of a SENIOR ENGINEERING ASSISTANT (Electrical) at a salary in A.P.T. Grade VI (£645 to £710).

Applicants must be Corporate Members of the Institution of Electrical Engineers and be capable draughtsmen with good experience in the preparation of schemes, specifications and estimates for all classes of electrical installation work. The duties will include the preparation of drawings, inspection of premises and supervision of installations.

Applications, on forms obtainable from the County Architect, Springfield, Maidstone, must be delivered to him within fourteen days of the appearance of this advertisement.

W. L. PLATTS,
Clerk of the County Council.

County Hall, Maidstone.
November 2, 1951. (P 123)

BRITISH ELECTRICITY AUTHORITY

REGIONAL SAFETY OFFICER

BRITISH Electricity Authority invite applications for the post of Regional Safety Officer with headquarters in Leeds.

Applicants should have good engineering qualifications and experience preferably in the Electricity Supply Industry. A knowledge of the Factories Acts and Safety Regulations applicable to the industry is essential and membership of one of the engineering institutions will be considered an advantage.

The successful candidate will be required to operate in the area of the Yorkshire Division and Area Board from headquarters in Leeds, under the direction of the Chief Safety Officer.

The appointment, which is superannuable, will be within the provisional salary range of £1,100 to £1,400 per annum.

Applications, giving full particulars of training, qualifications, experience, age and present salary, should be forwarded to D. Moffat, Director of Establishments, British Electricity House, Great Portland Street, London, W.1, to arrive not later than November 24, 1951.

Please quote reference AE/218. (P 98)

BRITISH ELECTRICITY AUTHORITY

London Division

APPLICATIONS are invited for the following superannuable posts:—

SHIFT CHARGE ENGINEER
Battersea Generating Station

Applicants should have received a sound engineering training, with technical qualifications to at least Higher National Certificate standard, and should have had experience in the operation of modern high pressure, high temperature power station plant.

Salary and conditions in accordance with N.J.B. Schedule, Class "L," Grade 7, i.e. £946 1s. per annum inclusive of London Allowance.

System Operation Department
(1) FIRST ASSISTANT CONTROL ENGINEER
(2) GENERAL ASSISTANT ENGINEER

Applicants should have had practical training and have technical qualifications up to Graduate I.E.E. standard.

The commencing salaries will be in accordance with the N.J.B. Agreement, Schedule C, and within the following ranges, which are inclusive of London Allowance:

(1) Class "AX," Grade 5, £660 9s. to £803 5s. per annum and subject to an ultimate maximum in Class "EX" or £900 18s. per annum.
(2) Class "AX," Grade 8, £506 to £649 19s. per annum and subject to an ultimate maximum in Class "EX" of £728 14s. per annum.

BOILER HOUSE SUPERINTENDENT
Acton Lane Generating Station

Applicants must have had wide experience of boiler house maintenance and operation, including experience on pressures up to 600 lbs/sq inch. The duties will also include supervision of coal and ash plant operation.

Applicants should be suitably qualified technically and experience on Works and Local Advisory Committees will be an added qualification.

Salary and conditions in accordance with N.J.B. Schedule, Class "H," Grade 6, i.e. £848 8s. per annum inclusive of London Allowance.

BOILER HOUSE SHIFT CHARGE ENGINEER
Acton Lane Generating Station

Applicants should have had experience in the operational problems associated with chain grate water tube boilers.

The salary and conditions in accordance with N.J.B. Schedule, Class "H," Grade 9, i.e. £693 per annum inclusive of London Allowance.

ENGINEERING DRAUGHTSMAN
West Ham Generating Station

Applicants will be required to undertake general drawing office duties.

Salary and conditions in accordance with N.J.B. Schedule D, i.e. £438 rising to £574 7s. per annum inclusive of London Allowance.

INSTRUMENT ENGINEER
West Ham Generating Station

Applicants must be experienced in maintenance, testing and calibration of all types of power station instruments.

Higher National Certificate in Mechanical Engineering or similar qualification is desirable.

Salary and conditions in accordance with N.J.B. Agreement, Class "G," Grade 12, i.e. £539 14s. per annum inclusive of London Allowance.

Applications for all the foregoing stating age, qualifications and experience, should be addressed to the Divisional Secretary, British Electricity Authority, London Division, Ergon House, Horseferry Road, S.W.1, and should be received within 14 days of the appearance of this advertisement.

J. N. WAITE,
Divisional Controller.
(P 103)

BRITISH ELECTRICITY AUTHORITY

Eastern Division

APPLICATIONS are invited for the following appointments:—

JUNIOR ENGINEERS
Little Barford Generating Station

Salaries in accordance with Clause 35 of the Revised National Joint Board Schedule A, Class "G," Grade 16, £375 to Grade 14, £471 per annum, depending on qualifications.

Preference will be given to applicants who have had previous experience in a generating station and who have reached the standard of the Ordinary National Certificate in Electrical Engineering or its equivalent.

The appointments will be superannuable in accordance with the British Electricity Authority and Area Boards Superannuation Scheme.

Applications, stating age, experience and present position, should be sent to the Divisional Controller, British Electricity Authority, Eastern Division, Northmet House, Southgate, N.14, to arrive not later than November 16, 1951. Envelopes should be endorsed "Junior Engineers—Little Barford."

W. N. C. CLINCH,
Controller.

Northmet House,
Southgate, N.14. (P 100)

EASTERN ELECTRICITY BOARD

APPLICATIONS are invited for the following appointments:—

Area Headquarters—Ipswich

ASSISTANT—LIAISON AND PERSONNEL OFFICER'S DEPARTMENT. 115/51.R.

The duties of the post include the administration of schemes for the education and training of apprentices and junior staff. Candidates must have had a sound general education, possess good organising ability, and have had experience of joint consultation work, either in the Electricity Supply Industry or in a large industrial concern.

The salary will be in accordance with Grade 8 (Principal Assistant) of the National Joint Council Salary Agreement (£845 per annum by £35 to £950 per annum).

Apply to the Liaison and Personnel Officer, Eastern Electricity Board, Wherstead, Ipswich, Suffolk.

Norfolk Sub-Area

GREAT YARMOUTH/LOWESTOFT DISTRICT.
DISTRICT COMMERCIAL ASSISTANT. 117/51.R.

The successful candidate will be responsible to the District Commercial Engineer for the electrical installation and maintenance service, which includes supervision of domestic repair workshop. He should have considerable experience of this type of work and of estimating for electrical installations in factories, housing estates, etc. He should also be competent to advise consumers on all matters relating to tariffs and the sale and installation of electrical apparatus. A Higher National Certificate in Electrical Engineering or its equivalent would be an advantage.

The provisional annual salary will be £640.

Apply to the District Manager, Yarmouth, Eastern Electricity Board, Electricity Service Centre, Regent Road, Great Yarmouth, Norfolk.

Northmet Sub-Area

SOUTHGATE AND WOOD GREEN DISTRICT.
THIRD ASSISTANT ENGINEER. 116/51.R.

Candidates should have had a sound technical training and experience in the construction, operation and maintenance of h.v. and l.v. overhead and underground systems.

The salary will be in accordance with Class "F," Grade 9 of the National Joint Board Salary Agreement, commencing at £587 per annum, plus £29 per annum London Weighting.

Apply to the District Manager, Southgate and Wood Green, Eastern Electricity Board, 22 Station Road, Wood Green, London N.22.

Future salaries and conditions of service for the above appointments will be in accordance with agreements made from time to time by the appropriate negotiating bodies.

The successful candidates will be required to contribute to a superannuation scheme and may be required to undergo a medical examination.

Applications, stating age, education, qualifications and experience, with details of present appointment and salary, should be submitted to the person concerned within 14 days of the appearance of this advertisement. (P 95)

BRITISH ELECTRICITY AUTHORITY

North Western Division

APPLICATIONS are invited for the position of JUNIOR ENGINEER at the Kearsley Generating Station, Stoneclough, near Manchester.

The salary range for this position, which is superannuable, will be £375 to £524 per annum, in accordance with Grades 19/15, Class "K," of the N.J.B. Agreement.

Candidates should preferably possess technical qualifications, and previous experience in a generating station will be an advantage.

Applications, quoting vacancy number 598, stating age, qualifications, present position, and giving full details of education and experience, should be received by the Establishment Officer, British Electricity House, 825 Wilmslow Road, Manchester 20, not later than November 17, 1951. (P 102)

CROWN AGENTS FOR THE COLONIES

ELECTRICIAN/WIREMAN required by the Public Works Department, Falkland Islands, for one tour of two years. Commencing salary in the scale £418 rising to £463 a year (including temporary cost of living allowance). Free passages; liberal leave on full salary. Candidates, preferably single and under 40 years, must have served an apprenticeship as an electrician and have had good subsequent experience including experience on l.t. overhead line erection and cable jointing.

Apply at once by letter, stating age, full names in block letters, and full particulars of qualifications and experience and mentioning this paper, to the Crown Agents for the Colonies, 4 Millbank, London S.W.1, quoting on letter M.28939.B. The Crown Agents cannot undertake to acknowledge all applications and will communicate only with applicants selected for further consideration. (P 104)

BRITISH ELECTRICITY AUTHORITY

North Eastern Division

APPOINTMENT OF JUNIOR ENGINEER, ELECTRICAL MEASUREMENTS SECTIONS, TECHNICAL DEPARTMENT, DARLINGTON

APPLICATIONS are invited for the position of Junior Engineer in the Electrical Measurements Section of the Technical Department at Darlington.

The successful candidate's work will be chiefly concerned with the maintenance of electrical measuring instruments. Technical education should be at least National Certificate standard and apprenticeship in instrument manufacture and testing would be considered an added advantage.

The salary will be in accordance with Grade 9, Schedule "C" of the National Joint Board Agreement (£375 to £536 per annum) and commence at a point commensurate with qualifications and experience.

Superannuation will be in accordance with the British Electricity Authority and Area Boards Superannuation Scheme.

Forms of application may be obtained from the Divisional Secretary (Establishments), British Electricity Authority, North Eastern Division, Carliol House, Newcastle-upon-Tyne 1, to whom they should be returned to arrive not later than November 17, 1951.

(P 107)

BRITISH ELECTRICITY AUTHORITY

Southern Division

APPLICATIONS are invited for the position of BOILER HOUSE SHIFT CHARGE ENGINEER at Portsmouth Generating Station.

Candidates should have had a sound mechanical training and be experienced in all branches of engineering associated with the design and operation of h.p. boiler plant.

Applicants should preferably be in possession of technical qualifications admitting to corporate membership of a recognised professional Institution.

The salary will be in accordance with Grade 9, Class "G," of the National Joint Board's Schedule, at present £621 to £648 per annum.

Forms of application should be obtained from the undersigned and should be returned not later than Friday, November 23, 1951.

P. D. A. OLIVER,
Divisional Secretary.

British Electricity House,
High Street, Portsmouth. (P 119)

BRITISH ELECTRICITY AUTHORITY

South Western Division

MAINTENANCE ENGINEER (ELECTRICAL) NEWTON ABBOT GENERATING STATION

APPLICATIONS are invited for the position of Maintenance Engineer (Electrical) at Newton Abbot Generating Station.

Applicants should have had a wide experience of generating station electrical equipment and practical experience of E.H.T. switchgear and protective gear. Preference will be given to candidates who are Corporate Members of the Institute of Electrical Engineers, or who hold equivalent qualifications.

Salary and conditions of service will be in accordance with the National Joint Board Agreement, Class "F," Grade 6, £713 to £747 per annum.

The appointment will be superannuable in accordance with the British Electrical Authority and Area Boards' Superannuation Scheme.

Applications, stating age, qualifications, experience, present appointment and salary, should be addressed to the Divisional Secretary, British Electricity Authority, South Western Division, British Electricity House, 26 Oakfield Road, Bristol 8, so as to be received not later than November 19, 1951.

R. C. BARRETT,
Divisional Secretary.

November 5, 1951. (P 126)

BRITISH ELECTRICITY AUTHORITY

South Western Division

STATION SHIFT CONTROL ENGINEER— NEWTON ABBOT GENERATING STATION

APPLICATIONS are invited for the position of Station Shift Control Engineer at Newton Abbot Generating Station.

Applicants should possess good technical qualifications, and have had sound technical training and practical experience in the control and operation of steam generating plant and main switchgear.

Salary and conditions of service will be in accordance with the National Joint Board Agreement, Class "F," Grade 10, £557 to £578 p.a.

The appointment will be superannuable, in accordance with the British Electricity Authority and Area Boards' Superannuation Scheme.

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Applications, stating age, qualifications, experience, present appointment and salary, should be addressed to the Divisional Secretary, British Electricity Authority, South Western Division, British Electricity House, 26 Oakfield Road, Bristol 8, so as to be received not later than November 19, 1951.

R. C. BARRETT,
Divisional Secretary.

November 5, 1951. (P 125)

A LARGE firm manufacturing a wide range of electrical appliances has a vacancy in the Development Department for a PHYSICIST for work of a fundamental nature on a number of interesting projects. Essential qualifications, B.Sc., or higher degree. Applicants must be capable of investigating problems of heat transfer, thermal equilibrium and radiation characteristics as applied to domestic and industrial heating appliances, and preference will be given to those who have had experience in this field. Excellent prospects for advancement.—Applicants should give details in writing of their academic qualifications, age, and experience to: Personnel Manager, Simplex Electric Co. Ltd., Blythe Bridge, Stoke-on-Trent, N. Staffs. (P 81)

A LARGE company manufacturing domestic and industrial electrical heating and cooking equipment is transferring the Development Department to a large modern factory where appliance production has been concentrated in recent years, and has vacancies in the Design Drawing Office for ambitious DRAUGHTSMEN as follows:—(a) Seniors and Section Leaders with experience of heating and cooking equipment, either gas, electric, or solid fuel; (b) Seniors and Section Leaders with experience of electrical appliances, cookers or water heaters or irons, fires, toasters, or similar products; (c) Draughtsmen under 25 years of age with National Certificate or equivalent and works experience. Excellent working conditions and prospects of advancement in all grades.—Apply in writing, giving details of qualifications, age, and industrial experience, to Personnel Manager, Simplex Electric Co. Ltd., Blythe Bridge, Stoke-on-Trent, N. Staffs. (P 82)

AN ELECTRICAL ENGINEER is required by a well-known Company for interesting work in the London area. Good all round knowledge of d.c. and a.c. machines of up to 50 h.p. and their control gear is essential. Applicants should be familiar with marine applications of these machines and be capable of preparing specifications and vetting and testing of designs.—Write, giving full details, mentioning ref.: IDA, to Box No. 1165, Electrical Times. (P 15)

APPLICATIONS are invited for the following appointments:—

(a) Civil construction and Building Inspectors with experience of large civil engineering and building contracts.

(b) Mechanical Engineering Assistant to Resident Engineer. Applicants should have had good workshop and, if possible, erection experience of turbo-alternators and other power plant.

(c) First-class Mechanic for plant maintenance. Applicants should have served a full apprenticeship in a general engineering works and have had experience in maintenance of permanent and portable plant. Preference will be given to applicants with diesel and steam power experience.

The above vacancies are for a large project in the Persian Gulf. No married accommodation is immediately available.

(d) Junior Engineer for London Office. Applicants must have had a good technical training in mechanical engineering and those with works experience will have preference.

Applications, in writing, giving full particulars of qualifications and past experience, should be addressed to: The Secretary, Ewbank and Partners Ltd., Engineering Consultants, 15 Grosvenor Place, London S.W.1. (P 120)

APPLICATIONS are invited from DESIGN ENGINEERS for positions in our Development Department which is being moved into the North Staffordshire area. A degree in science or engineering or a Higher National Certificate or equivalent qualification is essential, together with some previous experience in mechanical-electrical laboratory work, and of appliances or electro mechanisms. Vacancies also for Juniors with equivalent qualifications but less experience. Excellent working conditions and prospects of advancement.—Please apply in writing, with full details of qualifications, age, and industrial experience, to Personnel Manager, Simplex Electric Co. Ltd., Blythe Bridge, Stoke-on-Trent, N. Staffs. (P 83)

BOX No. replies to be addressed to the ELECTRICAL TIMES, Sardinia House, Sardinia Street, London W.C.2

ASSISTANT ELECTRICAL ENGINEER required for Construction Project in Kent. Must be versatile, active, age not over 40. Technical Education to Higher National Certificate desirable. Practical experience in Lighting and Power installations, cables, motor and switch gear assemblies. Knowledge of flame-proof installations an advantage.—Apply in writing to Geo. Wimpey and Co. Ltd., Dept. 1, Hammersmith Grove, London, W.6. (N 228)

CROMPTON PARKINSON, LTD., invite applications for the position of DEVELOPMENT ENGINEER at their battery factory at Newport, Mon. Candidates should have undergone a recognised course of training in electro-chemical engineering work as applied to lead acid batteries and have had first-class experience in their design and production. The candidate appointed would be directly responsible for all battery development work, and a good salary will be offered to the right applicant. Superannuation fund. Five-day week.—Apply, giving details of education, training and experience, to Chief Personnel Officer, Crompton Parkinson, Ltd., Crompton House, Aldwych, W.C.2. (P 90)

CROMPTON PARKINSON LTD., invite applications for the position of TESTING ENGINEER in their battery factory at Newport, Mon. Candidates should be aged 25 to 35 and have had training in Electrical Technology as applied to lead acid batteries. They should preferably have had previous experience in this type of testing work. The successful applicant will be required to spend a brief training period in the London area before taking up the post in Newport. Lodging allowance is payable during this training period. Five-day week; superannuation fund.—Apply giving details of education, training, experience and salary required to Personnel Officer, Young Accumulator Co., Ltd., Malden Way, New Malden, Surrey. (P 13)

DESIGN DRAUGHTSMAN required for interesting work on small mass produced electro-mechanical devices. Progressive post.—Write full details of experience and salary required to Box No. 1159, Electrical Times. (N 222)

DESIGNER of domestic electrical accessories required by leading Midland manufacturer. Knowledge of modern a.c. practice desirable.—Reply with full details of experience and salary required.—Box No. 26, Allardyce Palmer Ltd., 109 Kingsway, London W.C.2. (P 121)

DRAUGHTSMAN required for Contracts Section, experienced on flat back and cubicle type switchgear and able to do diagrams. Good salary offered for suitably qualified applicant. Pension scheme available.—Reply, stating age, salary, and full details of technical qualifications and experience to Erskine, Heap & Co. Ltd., Lancashire Switchgear Works, Salford, Manchester 7. (N 237)

DRAWING OFFICE STAFF with experience of electrical cooking design, required by Birmingham manufacturers of industrial equipment. State experience, age and salary required.—Box No. 1195, Electrical Times. (P 92)

ELECTRICAL ENGINEER, B.Sc. or Higher National standard, to deal with investigation and research on k.v. high power work, required by leading manufacturer in South-East Lancashire. Age 25 to 35.—Box No. 1189, Electrical Times. (P 70)

ELECTRICAL ENGINEER, with good theoretical background to at least O.N.C. standard and with practical experience in use of valves in audio and radio frequency circuits, is required in the valve life testing laboratory at the G.E.C. Research Laboratories, Wembley, Middlesex. —Apply to the Staff Manager (Ref. GBLC/O/266), stating age and record. (P 131)

ELECTRICAL SERVICE ENGINEER wanted for Scotland. One having sales ability given preference. Excellent opportunity for man with "go."—Box No. 1199, Electrical Times. (P 110)

ELECTRICAL wholesaler requires REPRESENTATIVES for Kent, Sussex, Surrey and Hants, to take over existing connections and extend business. Applicants must be car owners, have previous experience and some connections in the area. Accommodations could be arranged after trial period. Salary, commission and expenses paid.—Please write in strict confidence stating age, experience and references. Box No. 1183, Electrical Times. (P 49)

ELECTRICIAN, FOREMAN, required by Eastern Electricity Board at Witham, Essex. Rate of pay, at present 3s. 6½d. per hour, and conditions of service as laid down by National Joint Industrial Council for electricity supply industry.—Apply in writing, to District Manager, North Essex, Eastern Electricity Board, Cressing Road, Braintree, Essex, within the next fourteen days. (P 108)

EXPANDING, independent lamp works requires GENERAL FOREMAN. Wide manufacturing experience desirable, energy, drive and leadership essential. House available to suitable applicant.—J.W.F., Box No. 1197, Electrical Times. (P 109)

ENGINEERS, electrical and mechanical, with qualifications to degree or H.N.C. standard, are required for interesting experimental work on gyroscopes, small mechanisms and electro-mechanical devices at Stanmore (Middx). Good salaries and prospects offered.—Apply to the Staff Manager (Ref. GBLC/207), Research Laboratories of The General Electric Co., Ltd., Wembley, Middlesex, giving age, qualifications and record. (P 10)

FIRST-CLASS INSTRUMENT MAKER, with knowledge of mechanical and electrical clocks and mechanisms, required for Clock Experimental Department. Good starting salary plus profit sharing. Canteen facilities.—Apply: Personnel Manager, S. Smith and Sons (England) Ltd., Waterloo Road, N.W.2. (P 71)

LIGHTING REPRESENTATIVE required for London area. Must possess sufficient sales ability to interest potential customers in large fluorescent installations. Must also have thorough technical knowledge enabling him to initiate lighting schemes and discuss them in detail with lighting consultants, architects, etc.—Write, giving full particulars in confidence to Box AC67173, Samson Clarks, 57/61 Mortimer Street, W.1. (P 122)

MALES, TESTERS FOR ELECTRICAL MEASURING INSTRUMENTS. Experience desired but not essential. Good opportunities for young men with required electrical qualifications.—Write for interview, stating age and previous experience: Sangamo Weston Ltd., Cambridge Road, Enfield, Middlesex. (N 187)

MERCURY arc rectifiers. Vacancy for JUNIOR DESIGN ENGINEER for work of exceptional interest with good prospects. Previous rectifier experience not necessary, but Honours Degree and some works training essential.—Apply to: Manager, Rectifier Engineering Dept., The British Thomson-Houston Co. Ltd., Rugby. (P 124)

PLUMBER JOINTERS and MATES are required for factory installation work in the Midlands.—Write stating age and previous experience to Box No. 1175, Electric Times. (P 25)

POWER STATION ENGINEER. Opportunity will shortly occur with British-managed group of power stations in India for Senior M.I.M.E., M.I.E.E., or equivalent, experienced all branches power generation and distribution, in particular to be responsible for the running and maintenance of a group of thermal stations comprising B. and W. water tube boilers, turbo-alternators and auxiliary plant. Excellent remuneration and amenities will be offered to right man, with probability of promotion to senior position at an early date. Age about 35.—Applications, in writing, to Box 5379, c/o Charles Barker and Sons Ltd., 31 Budge Row, London E.C.4. (P 73)

PRACTICAL ELECTRICAL ENGINEER required by a major industrial concern to act in a supervisory capacity on sites in London and the provinces and should therefore be prepared to travel. Applicants will be engaged on new projects and should have full experience in the installation of electrical services in factories and should be conversant with all forms of motor control and contactor relays, also automatic controls, including testing.—Apply, giving details of age, experience and salary required, to Box No. 1193, Electrical Times. (P 89)

PROFESSIONAL HELP required by leading Correspondence College to prepare a Course of study on Refrigeration.—Apply, giving full details of qualifications and experience, to Box No. 1187, Electrical Times. (P 69)

REQUIRED for Switchgear Department, TENDERING and CONTRACT ENGINEERS with experience of l.t. and h.t. switchgear up to 11 kV. Knowledge of 33 kV gear an advantage. Non-contributory pension scheme. Five-day week. Age 21 to 30. Possible housing assistance. Quote ref. RWS/CM.—Brush Electrical Engineering Co., Loughborough, Leicestershire. (P 14)

SALES ENGINEER required for preparation of motor control gear tenders.—Applications to be made in writing, stating previous training, experience and salary required, marking envelopes "Sales Engineer," to Personnel Manager, Metropolitan-Vickers Electrical Co. Ltd., Trafford Park, Manchester 17. (N 190)

SIMPLEX ELECTRIC CO. LTD., Blythe Bridge, Stoke-on-Trent, N. Staffs, have vacancies in the Appliance Development Department for SENIOR and JUNIOR DRAUGHTSMEN and DESIGN ENGINEERS with experience of domestic or industrial cooking and heating appliances.—Applicants are invited to write giving full details of qualifications and industrial experience, to the Personnel Manager. Interviews can be arranged in Birmingham or at Blythe Bridge on Saturdays if desired. (P 84)

TRANSFORMER DESIGN ENGINEER required by the General Electric Co. Ltd., Witton, Birmingham. The position is a senior one and applicants must be experienced in service voltages up to at least 132 kV and the largest kVA sizes.—Apply, giving full details of age, experience and salary required, and quoting "Transformer Design Engineer," to Staff Manager. (P 111)

TECHNICAL ASSISTANTS required by British Insulated Callender's Cables Ltd., for: (a) development, and (b) electrical testing of electro static capacitors, at their Helsby Works. Candidates should hold National Certificate, Higher National Certificate or equivalent, in electrical engineering or in chemistry. Permanent position with superannuation and bonus schemes after twelve months' probationary service.—Applications, giving details of qualifications and experience, should be made in writing to: The Staff Officer, B.I.C.C. Ltd., Prescot, Lancs. (P 91)

THE BRITISH OXYGEN COMPANY LIMITED has a vacancy for an ASSISTANT ELECTRICAL ENGINEER in their development group at their head office in London. Applicants should at least be qualified up to Higher National Certificate or equivalent, and should have a knowledge of the design, layout, operating and testing of electrical installations in factories, including, if possible, some knowledge of flameproof installations, high-tension and low-tension switchgear, drawing office experience, preparation of specifications, enquiries, reports and estimates of cost.—Apply, giving full details of age, qualifications, experience and salary required, to Dept. M.98, Bridgewater House, Cleveland Row, St. James's, London, S.W.1. (P 86)

TRANSFORMER DESIGNER with experience of all types of distribution transformers up to 2,000 kVA.—Particulars of experience, age, salary, Lindley Thompson Transformers, St. Mary's Road, Slough. (P 130)

YOUNG TRANSFORMER SALES ENGINEERS required by important manufacturing company in N.E. London area. Degree or equivalent essential and previous transformer experience an advantage.—Applicants should give details of education, training, experience and salary expected to Box 1191, Electrical Times. (P 72)

APPOINTMENTS WANTED

EXPERIENCED ELECTRICIAN requires contracting business, or partnership in going concern.—Box No. 1161, Electrical Times. (N 234)

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REWINDS, REPAIRS and CONVERSIONS, large and small. Industrial installations, plant maintenance. Prompt efficient service, moderate charges.—Magstarlite Ltd., Beavor Works, Beavor Lane, Hammersmith, London W.6. Tel.: Riverside 4291. (P 128)

WANTED

A.C./D.C. MOTORS, STARTERS, complete changeover installation, etc.—A.A. Electrical Co., Ltd., 67 Rothschild Road, Chiswick Park, W.4. Tel.: Chiswick 5108 (A 20)

ARTICLES WANTED—RECTIFIER, input 230 V S.P., output 220 V D.C.—Wilson, Roden Street, Belfast N.I. (P 113)

BEST prices and a square deal offered in cash for ALUMINIUM, BRASS AND COPPER in sheets or rods. Works clearances and scrap a speciality.—Dyas and Fowle, 41 Loudoun Road, London N.W.8. Maida Vale 5477, 8641 and 5489. (N 61)

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SCRAP ACCUMULATOR PLATES and Sediment wanted, any quantities. Also Storage Batteries purchased and dismantled.—Phone or write, Elton Levy Co. Ltd., St. Ermin's (West Side), Caxton Street, London S.W.1. Tel.: WHItehall 9621/2/3. (A 3)

STEEL sheets, strip, bars, ALUMINIUM sheets and strip. Any quantity, immediate payment.—Grades Sheared Metal Co. Ltd., Green Lane, Hounslow, Middlesex. Tel. Feltham 3274. (N 208)

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MANUFACTURERS' AGENTS ASSOCIATION, INC. (E.T.), 8 Bream's Buildings, London W.C.2, supplies free lists of Agents to Manufacturers seeking representation in important industrial centres. Membership available to established agents only. Particulars supplied. (A 7)

OLD ESTABLISHED electrical wholesaler in Dublin, Ireland, with suitable premises is anxious to obtain a stockist agency for CONDUIT FITTINGS also CONDUIT. Further details may be had on application.—Box No. 1171, Electrical Times. (P 23)

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FOR SALE, large stock of SPARES, TOOLS and EQUIPMENT suitable for elec. eng. contractors. Must be purchased in one lot. Inventory will be furnished in first instance.—Write O2N7, Wm. Porteous and Co., Glasgow. (P 116)

FOR SALE, 100 MILD STEEL PLATES, 10½ in. dia. by ¾ in. thick, flame cut.—Insull and Pointon Ltd., St. Mary's Engineering Works, Tunstall, Stoke-on-Trent. (P 118)

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SOME SPARES AVAILABLE FOR Paxman 6 and 12, cylinder TP diesels.—Box No. 1173, Electrical Times. (P 24)

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For further details please contact H. C. Troldahl Ltd., 40 Scotswood Road, Newcastle-upon-Tyne 4. (P 21)

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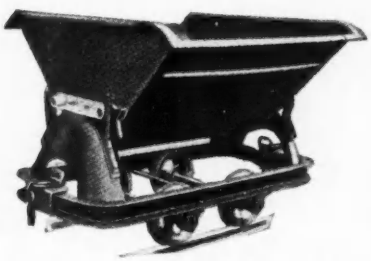

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120	1,000	Brook	S. Protected	Slip Ring
90	1,000	Brook	S. Protected	Slip Ring
75	740	Crom-Park.	T.E.F.C.	Slip Ring
70	1,500	Brook	S. Protected	Squirrel Cage
67½	1,500	Brook	Enc. Vent.	Slip Ring
65	1,500	Brook	S. Protected	Slip Ring
60	750	Brook	S. Protected	Slip Ring
55	1,440	Brush	S. Protected	Slip Ring
53	1,500	Brook	S. Protected	Squirrel Cage
50	1,000	Brook	S. Protected	Slip Ring
50	1,500	L.S.E.	S. Protected	Slip Ring
50	465	Brush	S. Protected	Squirrel Cage
45	750	Brook	T.E.S.C.	Slip Ring
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42½	1,500	Brook	S. Protected	Slip Ring
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40	1,500	Brook	S. Protected	Slip Ring
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30	960	Verity	S. Protected	Slip Ring
30	960	Crom-Park.	S. Protected	Slip Ring
30	1,500	Brook	S. Protected	Slip Ring
27½	1,450	Brook	S. Protected	Squirrel Cage
27	970	B.T.H.	T.E.F.C.	Squirrel Cage
27	960	Crom-Park.	Pipe Vent	Squirrel Cage
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25	580	G.E.C.	Protected	Slip Ring
25	580	Bruce-Peebles	T.E.F.C.	Slip Ring
25	750	Brook	S. Protected	Slip Ring
25	1,000	L.S.E.	S. Protected	Slip Ring
25	720	L.D.C.	Enc. Vent.	H. Torque
25	735	Crom-Park.	S. Protected	Squirrel Cage
25	975	B.T.H.	T.E.F.C.	Squirrel Cage
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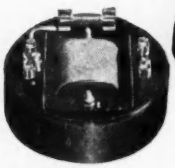

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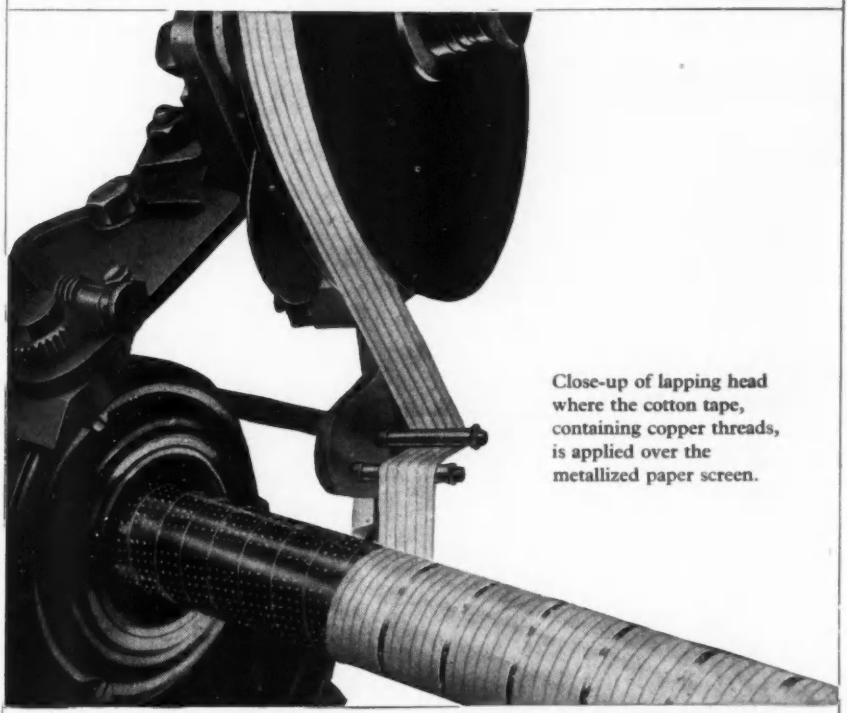

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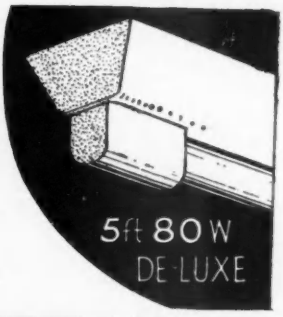

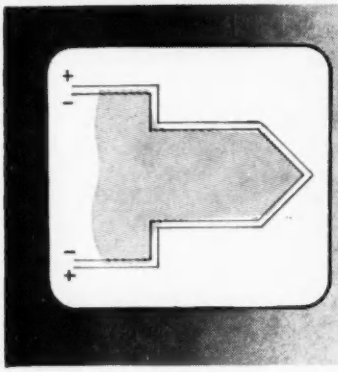

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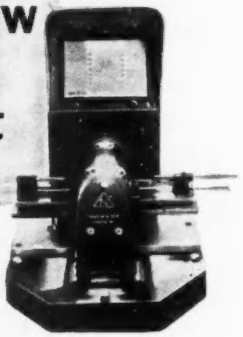

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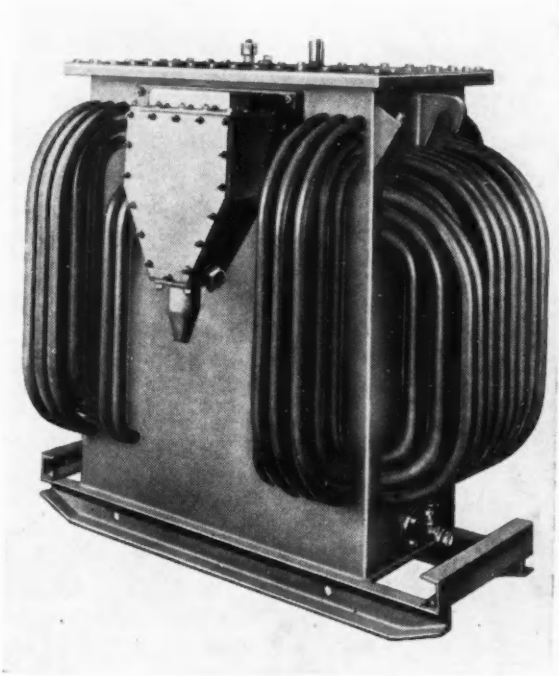

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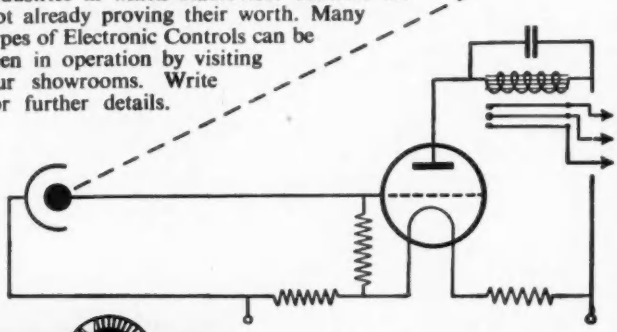

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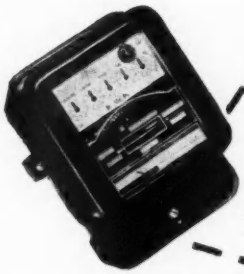

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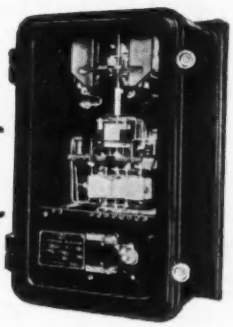

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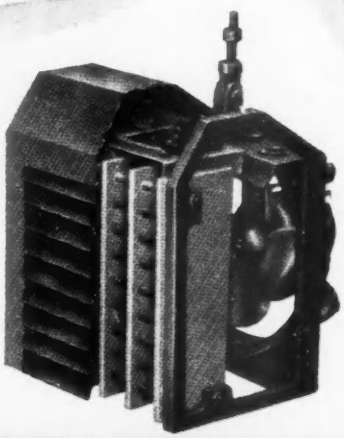

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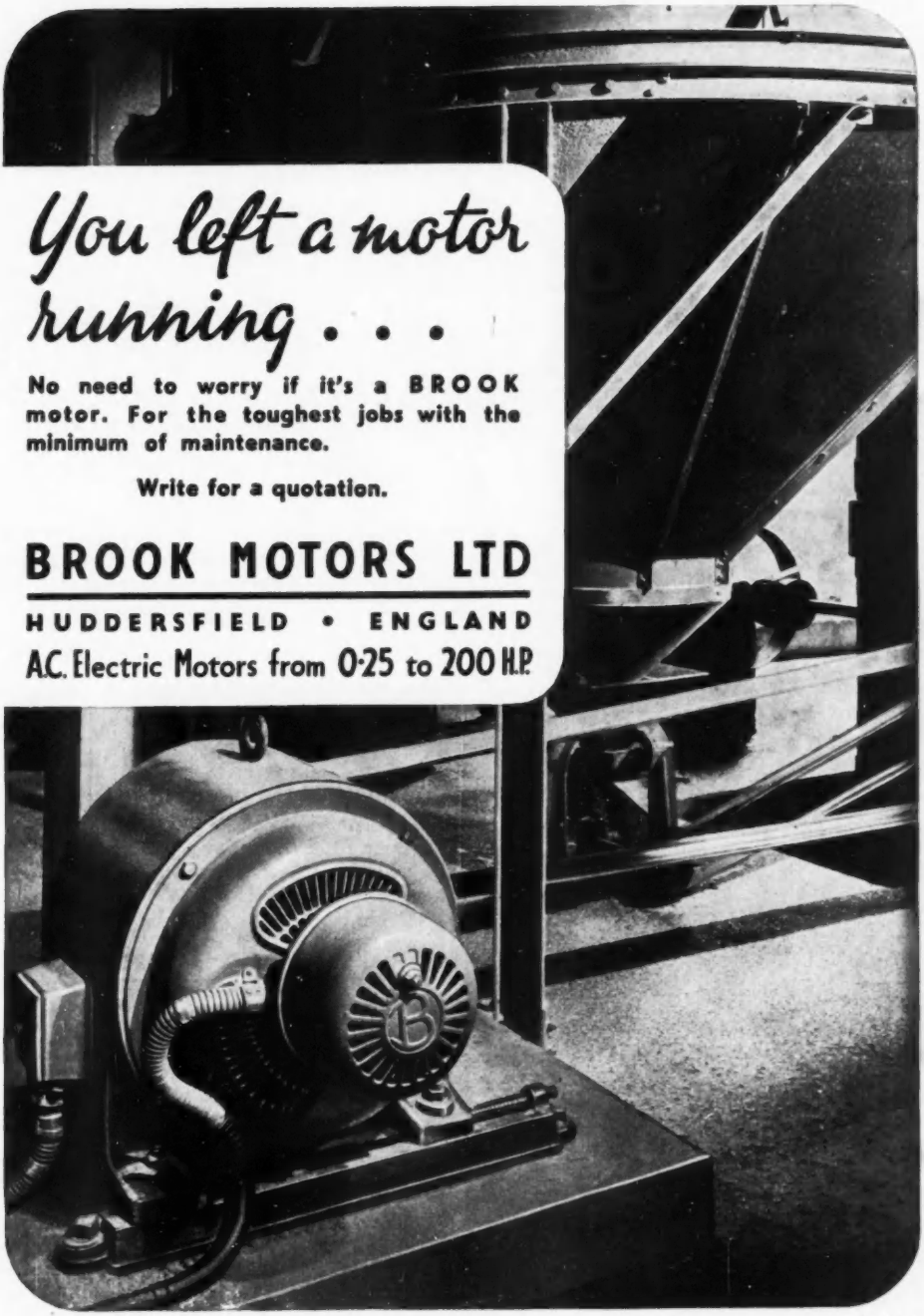
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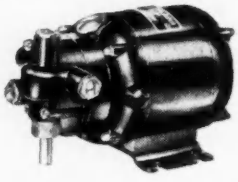

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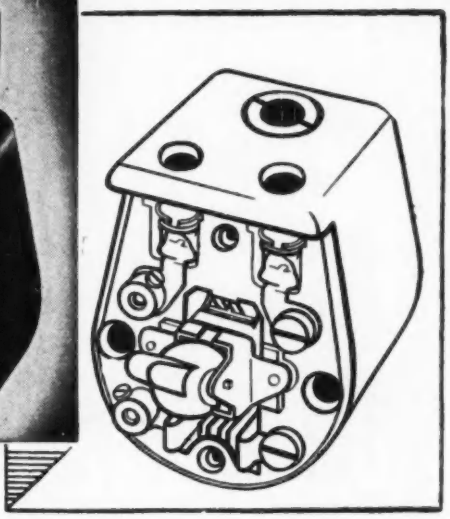

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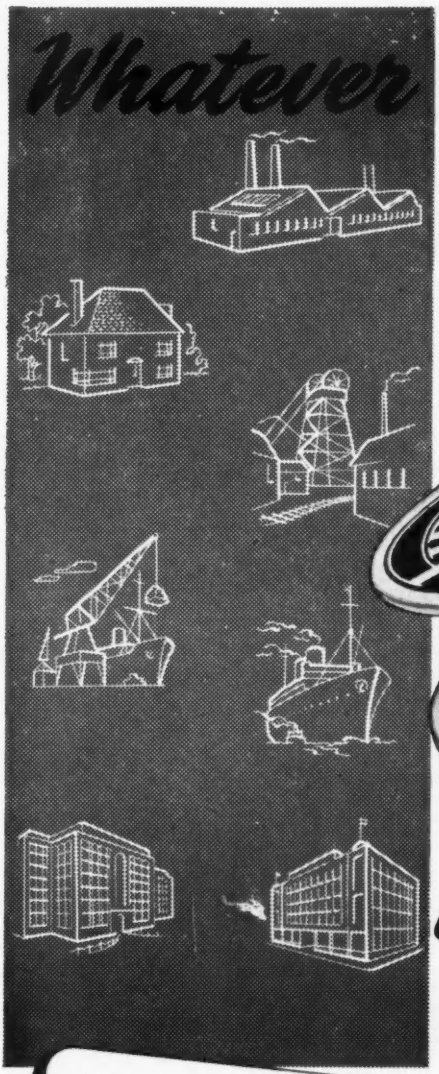

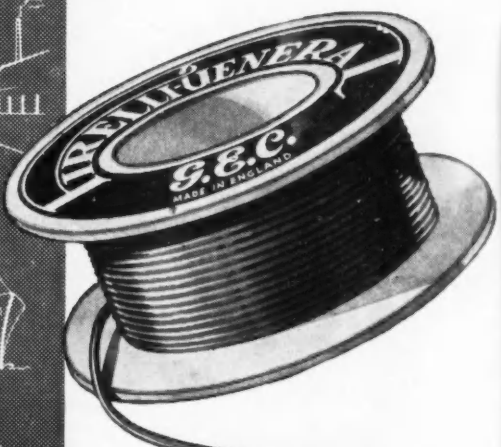

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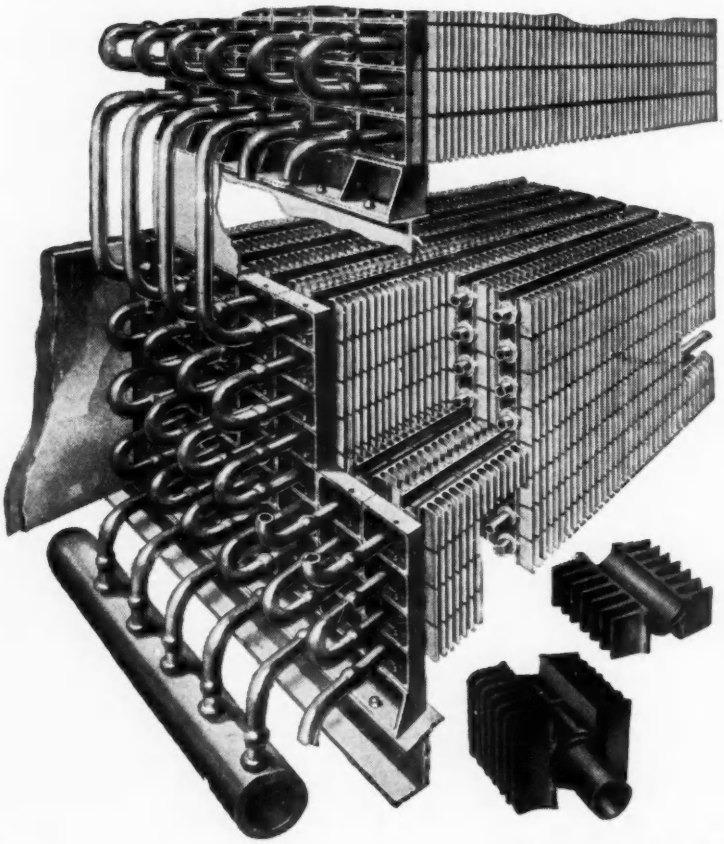

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